

6 BIODIVERSITY

6.1 INTRODUCTION

This chapter assesses the likely significant direct and indirect effects that the Project may have on Terrestrial Ecology, including habitats, flora, invertebrates, mammals and birds, and sets out the mitigation measures proposed to avoid, reduce or offset any potential significant effects that are identified. The residual effects on terrestrial ecological interests are then assessed. The Project refers to all elements of the application for the construction and operation of Moanmore Lower Wind Farm (as described in detail in **Chapter 2: Project Description**). The assessment considers the potential effects during the following phases of the Project:

- Construction of the Project
- Operation of the Project
- Decommissioning of the Project

This chapter of the EIAR is supported by **Figures 6.1 - 6.4** provided in Volume III:

Figure 6.1: Distribution of SACs within a 15 km radius of Development Site.

Figure 6.2: Distribution of SPAs within a 15 km radius of Development Site.

Figure 6.3: Distribution of NHAs and pNHAs within a 15 km radius of Development Site.

Figure 6.4: Distribution of principal habitats within proposed wind farm Site.

Technical Appendix documents are provided in Volume IV of this EIAR:

- **Appendix 6.1** Total plant species list for habitats encountered within the Site for the proposed wind farm.
- **Appendix 6.2** Bat Survey Report, Moanmore Lower Proposed Wind Farm. O'Donnell Environmental, January 2025.
- **Appendix 6.3** Marsh Fritillary Survey Report, Moanmore Lower Proposed Wind Farm. Jennings O'Donovan & Partners, December 2023.
- **Appendix 6.4** Bird Survey – Desktop Study and Survey Methodology, Proposed Moanmore Wind Farm, Co. Clare. Malachy Walsh and Partners, May 2023.
- **Appendix 6.5** Bird Survey Appendices 6.5.1 - 6.5.10. Malachy Walsh and Partners, May 2023.
- **Appendix 6.6** Bird Activity Survey Report, Winter 2022/23. Irish Ornithological Survey Group, July 2023.
- **Appendix 6.7** Bird Activity Survey Report, Breeding Season 2023. Irish Ornithological Survey Group, October 2023.

- **Appendix 6.8 Bird** Activity Survey Report, Winter 2023/24. Irish Ornithological Survey Group, June 2024.
- **Appendix 6.9** Barn Owl Buildings Survey, Moanmore, Co. Clare. Prepared by Michael O'Clery. June 2023.
- **Appendix 6.10** Collision Risk Modelling Report. Prepared by Dr Tom Gittings, October 2024.
- **Appendix 6.11** Biodiversity Enhancement and Management Plan (BEMP).

A Construction Environmental Management Plan (CEMP) is appended to the EIAR in **Appendix 2.1**. This document will be a key construction contract document, which will ensure that all mitigation measures that are considered necessary to protect the environment, are implemented.

6.1.1 Assessment Structure

In line with the revised EIA Directive and current EPA guidelines the structure of this Biodiversity chapter is as follows:

- Details of the assessment methodology utilised for desk and field studies, in the context of legal and planning frameworks.
- Description of baseline ecological conditions at the Site.
- Identification and assessment of impacts to ecological interests associated with the Development at all stages of the project life cycle, *i.e.* construction, operation and decommissioning phases of the Development.
- Identification of alternatives to prevent/mitigate likely significant effects.
- Identification and assessment of residual effects of the Development considering mitigation measures.
- Identification and assessment of cumulative effects, if and where applicable.

6.1.2 Project Description

The Development will consist of the following main components (refer to **Chapter 2: Project Description** for details):

- erection of 3 no. wind turbines with an overall ground to blade tip height of 150m, with a rotor diameter of 136m and a hub height of 82m and a total generating capacity of 15MW,
- construction of turbine hardstand areas and turbine foundations,
- construction of new internal site access tracks and upgrade of existing site track, to include all associated site drainage,

- construction of 1. no new site entrance along the turbine delivery route with access onto the adjoining local road network (L6132),
- construction of 1 no. temporary construction compound with associated temporary site offices, parking areas and security fencing,
- development of a site drainage network,
- construction of 1 no. 38kV electrical substation with all associated electrical plant and equipment, security fencing, lightening protection, security cameras and gates, and all ancillary structures and works,
- 1 no. permanent spoil storage area,
- all wind farm internal cabling connecting the wind turbines to the electrical substation,
- all works associated with the permanent connection of the wind farm to the national electricity grid comprising a 38kV underground cable in permanent cable ducts from the proposed, permanent, on-site substation and to the existing Tullabrack 110kV ESBN Substation,
- 2 no. flood compensation areas,
- vertical realignment of an existing crest curve on the L6132 local road in order to prevent grounding of abnormal load vehicles during delivery of turbine components,
- ancillary forestry felling to facilitate construction and operation of the development,
- construction of a blade transfer area off the L6132,
- provision of 2 no. biodiversity enhancement areas,
- upgrade of an existing site entrance onto the adjoining local road network (L2034) including the demolition of an existing wall and removal of hedgerow at the site entrance to facilitate abnormal load vehicles during delivery of turbine components and reconstruction of same wall and replanting of hedgerow,
- Landscaping and all associated ancillary works.

A 10-year planning permission and 40-year operational life from the date of commissioning of the entire wind farm is being sought. However, part of the substation and all of the grid connection will be handed over to ESB networks to own and operate. As part of the national grid infrastructure, their life can extend beyond the life of the wind farm. Accordingly, permission is sought for the grid connection and substation in perpetuity.

The EIAR assesses the Project which includes the Development as outlined above; it includes improvements and temporary modifications to the existing public road infrastructure to facilitate delivery of abnormal loads and turbine delivery. The red-line boundary and all works assessed as part of the Project are shown on **Chapter 1: Figure 1.2a and 1.2b.**

6.1.2.1 Grid Connection Route (GCR)

Connection will be sought from the grid system operators by application to ESB Networks Limited. Moanmore Lower Green Energy has assessed possible connection options for the Project and found that a 38kV connection to Tullabrack 110kV substation is the most expedient option, both environmentally and economically, subject to the substation having grid off-take capacity. The Grid Connection can be summarised as follows:

- Underground cable (UGC) single 38kV circuit from the proposed Moanmore Lower wind farm to Tullabrack substation utilising sections of UGC primarily public roads, regional roads, and private lands. [approx. 2.76 km]

The route of the Grid Connection is provided in **Chapter 2: Figure 2.4** with full details in **Section 2.5.10**. The GCR will be constructed to the requirements and specifications of ESB Networks Limited. The three conductors for the GCR will be laid in separate ducts as required by the ESN functional specifications for 38kV Networks Ducting/Cabling (Minimum Standards). The 38kV cable trench with a trefoil formation will measure 600mm wide, and 1.22 m deep. A separate duct will be provided within the trench for fibre optic communications. Refer to ESN Cable ducting Specifications in **Appendix 2.2**.

Cable Joint Bays

Joint Bays are pre-cast concrete chambers where individual lengths of cable will be joined to form one continuous cable. A joint bay is constructed in a pit. Each joint bay will typically be 6 m long x 2.5 m wide x 2.3 m deep, pre-cast, reinforced, concrete structures installed below finished ground level.

Watercourse Crossings

No new watercourse crossings are required over any EPA mapped watercourse. Existing land drains have been consolidated on Site to reduce the number of water crossings. There are eight (No. 8) watercourse crossings of historic drains and mapped drains required for the construction of access tracks and hardstands within the Site. These water crossings will be constructed using pre-cast concrete or pre-formed plastic pipes.

There is one existing watercourse crossing (Moyasta EPA Code: 27M04) (WC01) along the preferred GCR which is outlined in **Chapter 9: Hydrology and Hydrogeology - Figure 9.2**. The cabling will be laid in the carriage of the bridge or will be installed using HDD.

There are three existing watercourse crossings (WC02-WC04) along the L6132 which are outlined in **Chapter 9: Hydrology and Hydrogeology - Figure 9.2**. At these three locations steel plates will be placed on the verge for 10 m each side of watercourse crossings. This will avoid excavation and disturbance of the existing ground.

6.1.2.2 *Turbine Delivery Route (TDR)*

The turbine components for the proposed Development will be shipped to Shannon Foynes Port. The turbine components will be transported on the public road network using abnormal load vehicles between Shannon Foynes Port and the Site (refer to **Figure 16.3 in Chapter 16: Traffic and Transport**).

Road widening, and verge strengthening, of the L6132 along its length up to the junction with the N68 road at Derreen cross is required to facilitate the delivery of turbine components using abnormal load vehicles. Vertical realignment of a crest curve on a small section of the L6132 (0.028 ha) in the townland of Gower South will be required to prevent abnormal load vehicles from grounding. Road widening along the L2034 between Tullabrack Cross and the junction with the L2036 will be carried out to accommodate increased volumes of HGV vehicles associated with the construction of the wind farm. The road widening and verge strengthening are temporary works. The vertical realignment works are permanent.

The verge strengthening and widening of the L6132 and the widening of the L2034 and L2036 will be carried out in the existing road verge to increase the running width of the L6132, the L2036 and the L2034 local roads to 4.5m (and 5.5m at passing locations). It will be constructed to withstand wheel loading from abnormal load vehicles delivering turbine components to the wind farm site. The works will involve excavating a trench in the verge, placing geotextile and geogrid at the base of the trench, and backfilling the trench with granular material compacted in layers.

On the three watercourse crossings along the L6132, steel plates will be placed on the verge for 10 m each side of watercourse crossings to avoid excavation and disturbance of the existing ground. Upon completion of the wind farm construction, the L6132 verge will be reinstated by removing approximately 150 mm of granular material from widened sections and replaced with topsoil, steel plates will also be removed from the verge at this stage.

All works along the TDR are assessed in **Chapter 16: Traffic and Transport** and shown on drawings attached as **Appendix 16.1**.

6.1.3 Project Team

This Biodiversity chapter has been prepared by Dr Brian Madden (BioSphere Environmental Services) and is informed by ecological survey data and relevant reports from various ecologists as listed in **Table 6.1** below. Appendix 1.1 provides a list of author qualifications and relevant experience.

Table 6.1: Personnel involved in Terrestrial Ecological Assessment.

Project Member	Team	Qualifications & Experience	Role
Dr Brian Madden, BioSphere Environmental Services		BA. Mod. (Hons), PhD, MCIEEM Brian graduated in Natural Sciences from the University of Dublin in 1984 and earned a Ph.D. degree in 1990 from the National University of Ireland for his research on ecosystem processes in raised bogs. Since 1994, Brian has been the principal ecologist with BioSphere Environmental Services. Brian has carried out botanical surveys and habitat assessments for most terrestrial habitats which occur on the island of Ireland. He is also an experienced ornithologist, with particular interests in birds of prey and wetland birds. He has published a range of peer-reviewed research papers. Examples of energy projects that Brian has been involved in include: Grousemount Wind Farm, Cos. Cork/Kerry, Oweninny Wind Farm Phases 1 & 2, Co. Mayo, Castlepook Wind Farm, Co. Cork, Letteragh Wind Farm, Co. Clare, Kiltumper Wind Farm Co. Clare, Eglish Wind Farm, Co Tyrone, Connemara 110kV Overhead Line Reinforcement Project (40 km from Barna to Maam Cross and to Screeb Bay in Connemara.	Preparation of EIAR Chapter 6; habitat assessment; terrestrial mammal survey
Dr John Conaghan, Enviroscope Environmental Consultancy		BSc, PhD, MCIEEM John has over 25 years' experience of working on botanical projects throughout Ireland. He is a habitat specialist, with particular expertise in peatland and wetland habitats, as well as rare plants. John has worked with Coillte on their LIFE funded habitat restoration programme - he regularly contributes this expertise to Species and Habitat Management Plans. Examples of energy projects that John has been involved in include: Oweninny Wind Farm Phases 1 & 2, Co. Mayo, The Galway Wind Park, Grousemount Wind Farm, Cos. Cork/Kerry, Castlepook Wind Farm, Co. Cork, BGE Corrib Gas Pipeline from Bellanaboy, Co. Mayo to Craughwell, Co. Galway,	Habitat and botanical surveys; Report input
Tom O'Donnell, Principal Ecologist with O'Donnell Environmental		BSc, MSc, MCIEEM Tom is an experienced ecologist, with over 15 years professional experience in the environmental industry, including working on projects such as wind farms, overhead power lines, roads, cycleways and residential developments. Tom has particular experience in bat survey and is licensed by	Implementation of Bat Survey for project, analysis of data and preparation of risk assessment and

Project Member	Team	Qualifications & Experience	Role
		NPWS for roost disturbance (Ref: DER/BAT 2023-16) and to capture bats (C25/2023).	mitigation requirements
Ryan Mitchell, Ecologist with Jennings O'Donovan & Partners		BSc Ryan is a senior Environmental Scientist / Ecologist working at Jennings O'Donovan & Partners Ltd. He is an experienced entomologist, with specialisation in pollinator insects and Diptera (True flies). Ryan has much experience of working on large scale renewable energy projects (onshore wind & solar) as a Marsh Fritillary surveyor both in planning and construction stages. He has also carried out invertebrate monitoring surveys for NPWS within various Natura 2000 sites. He has published numerous papers in peer reviewed journals on terrestrial invertebrates in Britain and Ireland. Examples of energy projects requiring lepidoptera studies that Ryan has worked on include: Derrinlough Wind Farm, Co. Offaly; Carrickatane Wind Farm, Co. Tyrone, Clooncunny Wind Farm, Co. Sligo, Timahoe North Solar Farm, Co. Kildare.	Field survey for marsh fritillary and report preparation
John Murphy, formerly Malachy Walsh and Partners Now leading the Irish Ornithological Survey Group		John Murphy is a senior ornithologist (formerly with Malachy Walsh and Partners) and now leads the Irish Ornithology Survey Group as the Principal Ornithologist. He is highly experienced having worked in the field of ornithology and ecology since 1982 and has extensive knowledge of the Irish landscape with regard to bird populations. Examples of energy projects that John has provided ornithological surveys for include: Booltiagh Wind Farm, Co. Clare, Galway Wind Park, Barranstock Wind Farm, Co. Clare, Meenadreen Wind Farm, Co Donegal, Cusailling Wind Farm, Co. Offlay, Sheskin South Wind Farm, Co. Mayo.	Project ornithologist; Field Survey Team Lead; Report Input
Austin Cooney, Malachy Walsh and Partners		Austin Cooney has more than 35 years of bird surveying experience both in Ireland and abroad and has worked on a variety of projects in many locations around Ireland. He is proficient in Vantage Point surveys, Transect Surveys, Point Count surveys, Hinterland surveys, Merlin surveys and Red grouse surveys.	Bird field surveys
Michael O'Clery		Michael is an experienced ornithologist based in the southwest, and has carried out research on various bird species, including the now rare ring ouzel. Michael has a particular interest in birds of prey and owls and regularly carries out surveys for planning applications.	Barn Owl survey
Dr Tom Gittings Ecological Consultant		BSc, PhD, MCIEEM Tom has 27 years' experience in professional ecological consultancy work and research. He has specific experience in ornithological assessments for wind energy projects – his input includes field surveys, analysis of survey data sets and collision risk modelling.	Compilation of Collision Risk Modelling Report for project

Project Member	Team	Qualifications & Experience	Role
		Tom has extensive experience in ornithological assessments for wind farm projects and has been involved in numerous wind farm projects. His input to these projects has variously included field surveys, collision risk modelling, population viability analyses, writing the ornithological sections of EIS/EIAR and NIS reports, expert witness services at oral hearings, and provision of scoping advice and peer review services. Tom has specific expertise in collision risk modelling and assessment. In addition to carrying out the modelling, he has carried out research into factors that may bias the models. This research has been presented at scientific conferences, and part of the research has recently been published in the journal of the Chartered Institute of Ecology and Environmental Management (In Practice 126:40-44) • Scart Mountain Wind Farm, Waterford: collision risk modelling and population viability analyses (TOBIN 2024). • Cushbawn Wind Farm, Wicklow: population viability analyses (MKO 2023). • Cloghercor Wind Farm, Donegal: collision risk modelling and population viability analyses (TOBIN 2022). • Ballykett Wind Farm, Clare: collision risk modelling (Greensource 2022-2024). • Castlebanny Wind Farm: collision risk modelling (Blackthorn Ecology 2020). • Ummeras Wind Farm, Kildare: collision risk modelling (TOBIN 2020). • Barranafaddock Wind Farm, Waterford: collision risk modelling (Fehily Timoney 2019-2020). • Moanvane Wind Farm, Offaly: collision risk modelling (Fehily Timoney 2017-2020).	

6.2 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

6.2.1 Purpose of the Report

The purpose of this report is to:

- Establish and evaluate the baseline ecological environment of the Project site and environs as relevant to the proposed development.
- Identify, describe, and assess all likely significant direct, indirect and cumulative ecological effects associated with the proposed development.
- Set out the prevention and mitigation measures required to address any likely significant ecological effects and ensure compliance with relevant nature conservation legislation.

- Provide an assessment of the significance of any residual ecological effects.
- Identify any appropriate enhancement and/or post-construction monitoring requirements.

6.2.2 Relevant Legislation and Policy

The main pieces of legislation relevant to this chapter are as follows:

- The Wildlife Acts 1976 – 2023 as amended
- The Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora) as amended
- The Birds Directive (Council Directive 2009/147/EC) as amended
- European Communities (Birds and Natural Habitats) Regulations 2011 - 2021
- Flora (Protection) Order, 2022 (S.I. No. 235 of 2022)
- European Union (Invasive Alien Species) Regulations 2024 (S.I. No. 374/2024)
- Water Framework Directive (2000/60/EC) as implemented in Ireland..

In considering ecological survey and assessment of impacts of the proposed development, regard was made to the following guidance and information documents:

- EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2022).
- European Commission (2017) Environmental Impact Assessment of Projects. Guidance on the preparation of the Environmental Impact Assessment Report. (Directive 2011/92/EU as amended).
- NRA (2009). Guidelines for Assessment of Ecological Impacts of National Road Schemes.
- CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.
- Fossitt (2000). A Guide to Habitats in Ireland. Heritage Council, Kilkenny.
- Smith *et al.* (2011). Best Practice Guidance for Habitat Survey and Mapping in Ireland.
- NatureScot (2021). Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation. Scotland's Nature Agency. Version: August 2021 (updated with minor revisions).
- Northern Ireland Environment Agency, Natural Environment Division (2021) Guidance on Bat Surveys, Assessment and Mitigation for Onshore Wind Turbine Developments in Northern Ireland. Version 1.1. Belfast: Department of Agriculture, Environment and Rural Affairs (Northern Ireland).

- Marnell, F., Kelleher, C. & Mullen, E. (2022). Bat Mitigation Guidelines for Ireland. V2. Irish Wildlife Manuals, No. 134. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage. Dublin, Ireland.
- Balmer, D., Gillings, S., Caffrey, B., Swann, B., Downie, I. and Fuller, R. (2013). *Bird Atlas 2007-11: The breeding and wintering birds of Britain & Ireland*. BTO Books, Thetford.
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- Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. and Thompson, D. (2013). *Raptors: a field guide to survey and monitoring (3rd Edition)*. The Stationery Office, Edinburgh.
- Percival, S.M. (2003). *Birds and Wind Farms in Ireland: A Review of Potential Issues and Impact Assessment*. Sustainable Energy Ireland.
- Scottish Natural Heritage (2016). *Assessing Connectivity with Special Protection Areas (SPAs)*. Version 3. Scottish Natural Heritage.
- Scottish Natural Heritage (2017). *Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms*. Version 2. Scottish Natural Heritage.
- Scottish Natural Heritage (2018). *Assessing the cumulative impacts of onshore wind farms on birds*. August 2018. Scottish Natural Heritage.

6.2.3 Zone of Influence and the Study Area

The study area is defined by the zone of influence of the proposed Project with respect to the ecological receptors that could potentially be affected.

The Zone of Influence (Zoi), or distance over which potentially significant effects may occur, will differ across the Key Ecological Receptors (KERs), depending on the potential impact pathway(s). The results of both the desk study and the suite of ecological field surveys undertaken have established the habitats and species present within, and in the vicinity of, the proposed development site. The Zoi and study area was then informed and defined by the sensitivities of each of the KERs present, in conjunction with the nature and potential impacts associated with the proposed development.

The Zoi in relation to direct impacts on habitats and flora as a result of the proposed project will be confined largely to the area within the Redline Boundary of the proposed Development, including the grid connection route to Tullabrack substation, the blade transfer area and the vertical realignment of the crest curve on the L6132 on the TDR.

The ZOI of general construction activities (i.e. risk of spreading/introducing non-native invasive species, dust deposition and disturbance due to increased noise, vibration, human presence and lighting) is not likely to extend more than several hundred metres from the proposed Redline Boundary but could be further for some fauna species and especially birds and bats.

The ZOI for aquatic habitats will be more extensive, and the surveys undertaken were scoped accordingly for the proposed Project. This entailed establishing the baseline conditions in aquatic habitats at a range of points upstream and downstream in the various watercourses draining the Site, the Blade Transfer Area, the GCR and the TDR and is reflected in the range and extent of surveys undertaken. The SPR (Source-Pathway-Receptor) model was used to establish the ZOI. The source being the site and associated works, the pathway being the watercourses and the receptors being aquatic fauna downstream of the source. The ZOI for aquatic ecology followed a catchment-level approach.

For habitats and flora species, the main study area is all land within the Redline boundary. However, consideration is given to the potential for sensitive habitats, such as bogs, fens, springs etc., or protected or rare plant species (including bryophytes), to a distance of up to 1 km of the Redline boundary but more should ecological or hydrological connectivity exist. Such habitats may be part of designated sites at a national or international level (Department of Environment, Heritage and Local Government 2010). In the present assessment the study (or survey) area was taken to include all land within the Redline boundary, as well as all of the area of adjoining high bog (which extends to c.200 m south of T2 location).

For terrestrial mammal species, badger and otter, which both construct substantial dwellings, are identified as the principal species likely to be affected by the construction of the proposed Development. For badger, the main study area was a distance of at least 100 m of the proposed turbine and associated infrastructure locations (after NRA 2006 & NRA 2009b). For otter, all of the section of the main Moyasta River channel which passes alongside the northern boundary of the site was surveyed, extending upstream to the proposed crossing (WC01) was surveyed for otter presence. For watercourse crossings (WC02, WC03 and WC04) along the TDR and GCR (WC01) the potential to support otter was based on stream size and water quality. The survey area included the margins of the river to a distance of up to 10 m width (after NRA 2008 & NRA 2009b).

For bats, the desk review study area for all bat records extended to a distance of up to 30 km from the proposed wind farm site. A habitat assessment for bat potential, including assessment of value of trees as bat roosts, was carried out to a distance of 268 m from the 'redline' boundary (as it relates to turbines) (following NatureScot 2021 guidance) and the blade transfer area.

For bird activity surveys, the study area is the Development site within the Redline boundary plus a c.500 m buffer. The 500 m buffer is included to account for error when recording bird flight lines within the Redline boundary (NatureScot 2017). Surveys were also carried out to a distance of approximately 5 km from the Redline Boundary for the checking of suitable habitats, especially wetlands, which may support target species that are likely to be impacted by the proposed wind farm development - this wider area of survey for birds is generally referred to as the Hinterland area. Suitable habitat for winter roosting by hen harrier was surveyed to a distance of between 2 km and up to 5 km from the Redline boundary (NatureScot 2017).

The study area also included the route for the Grid Connection to Tullabrack substation and the Turbine Delivery Route for the turbine components.

Table 6.2: Summary of Study Areas for Main Ecological Receptors.

Receptor	Study Area Definition	References
Habitats & Flora	Redline boundary of site for core baseline survey; Extending to 1 km or beyond Redline boundary for sensitive habitats and plant species	Department of Environment, Heritage and Local Government 2010
Badger	100 m (minimum) from works area	NRA 2006; NRA 2009b
Otter	150 m (minimum) upstream and downstream of watercourse crossing points	NRA 2008; NRA 2009b
Bats	268 m from redline boundary at turbine locations; Up to 30 km for bat desk review	Nature Scot 2021
Birds	Redline boundary of site and 500 m buffer for activity surveys; Up to 5 km for hinterland surveys;	SNH (now NatureScot) 2017

Receptor	Study Area Definition	References
	Up to 2 km for hen harrier winter roost surveys	

6.2.4 Desk Study

A comprehensive desktop review was carried out to identify features of ecological importance within the study area and surrounding region. This comprised a review of available ecological data relating to habitats, flora and terrestrial mammals, including the following:

- Online web-mapper of National Parks and Wildlife Service (NPWS) for data on sites designated for nature conservation (European & National) and on protected flora species and protected bryophytes (see www.npws.ie/protected-sites - last accessed 6th March 2025),
- Online web-mapper of National Biodiversity Data Centre for protected species datasets (see <http://maps.biodiversityireland.ie> – last accessed 18th October 2024).

For bats, the following information sources were examined:

- Known bat records within a 30 km radius of the proposed wind farm development site from the Bat Conservation Ireland database (conducted on 5th May 2023)
- Ad-hoc and observational bat records from the National Bat Database held by the National Biodiversity Data Centre (www.biodiversityireland.ie/Map – accessed 05/09/2024), with focus on existing species records for the 10km square in which the study site is located (Q 95)
- Review of data held by National Parks and Wildlife Service relating to designated sites within a 15 km radius of the proposed wind farm development site where bats form part or all of the reason for designation (<https://www.npws.ie/protected-sites> - accessed 05/09/2024). In addition, a protected species data request was submitted to NPWS for information not otherwise publicly available regarding protected species such as the Annex II (EU Habitats Directive) listed Lesser Horseshoe Bat
- Review of relevant ecological reports and correspondence submitted as part of previous planning applications relating to the nearby sites (Clare County Council Ref. 23/60219; 24/60134).

For birds, a desktop study was conducted prior to the commencement of the field surveys in October 2020 (see **Appendix 6.4**). The following principal information sources were examined:

- Ordnance Survey Ireland (OSI) aerial photography and 1:50,000 mapping, and other sources of online aerial imagery (to assess physical features and habitats which may potentially support important bird species)
- Review of Bird Atlases: (especially Balmer *et al.* 2013).
- Review of Birds of Conservation Concern in Ireland (BoCCI) 2020-2026 (Gilbert *et al.* 2021).
- Review of BirdWatch Ireland I-WeBS (Irish Wetland Bird Surveys) site information.
- General ornithological information available from BirdWatch Ireland (www.birdwatchireland.ie).
- Irish Bird Reports and the journal *Irish Birds*, published by BirdWatch Ireland.
- Review of the 2015 National Survey of Breeding Hen Harrier in Ireland Report (Ruddock *et al.* 2016).

6.2.5 Consultation

As part of the study, consultation was made with the following relevant ecological parties:

- National Parks and Wildlife Services of the Department of Housing, Local Government and Heritage (no response received)
- BirdWatch Ireland (no response received)
- An Taisce (no response received)
- Irish Peatland Conservation Council (response received 22/08/2024 – see **Table 6.3**)

Table 6.3 Submission from Irish Peatland Conservation Council.

Summary of Consultee Response
<i>"We are legally bound by National and European legislation (The Irish Wildlife Acts, Habitats and Bird's Directives) and international conventions (Ramsar, Bern Convention, Convention on Biological Diversity) to do our utmost to protect peatlands now and for future generations. Peatland habitats have been severely diminished in the country and this destruction is an issue in other legislation and conventions such as the UN Convention on Climate Change, Bonn Convention, World Heritage Convention, Water Framework Directive, Environment Liability Directive, Planning and Development Acts, National Monuments Acts, Environmental Directive, EIA and SEA. All of these legislative instruments have been adopted by Ireland and the IPCC ask that you assess your development with regard to these legal obligations."</i>
Response: The Project has been assessed in line with all the relevant legislation s outlined in Section 6.2.2 <i>"Bogland The IPCC would advise any developer planning construction in, or within close proximity to peatland habitat to be familiar with the Environmental Protection Agency funded project BOGLAND (www.ucd.ie/bogland). This project recommends the best practice guidelines to ensure no damaging development occurs on, or affects peat soils and peatlands of conservation value."</i>

Response: This project has been designed using the best available guidance and legislation. There will be no significant effect on peatland habitat. See **Sections 6.2.2 and 6.4.4.**

Nitrogen It has been highlighted to the Irish Peatland Conservation Council that nitrogen is becoming an issue for designated sites, halting many construction projects in the Netherlands and in 2018 in the UK 39 of 57 Special Areas of Conservation listed on the APIS website (<http://www.apis.ac.uk>) exceeded the Critical Load Threshold for nitrogen (some by over 300%). This is having negative impacts on the vegetation of the designated habitats and is working against the conservation objectives of the sites. There are various sources of excess nitrogen such as construction (e.g. roads, traffic, developments), urban waste water (pollution) and agriculture (e.g. fertilizer/piggyerys) and can enter a habitat via wet or dry deposition. The Irish Peatland Conservation Council ask that you assess the development in terms of its impact in regards to nitrogen and its affects on designated sites. We also ask that there is a long term monitoring agenda implemented to ascertain the long term emission rates/vectors which can be used to inform future projects. The impacts also need to be taken into account cumulatively along with other developments and projects as they may interact synergistically.

Response: In the Netherlands the country has problem with soil infused with nitrogen compounds, mostly from intensive livestock farming¹. The land associated with the Development is marginal agricultural ground that has not been used for intensive agriculture. Potential effects to hydrology and hydrogeology from the Project (alone) and cumulatively with other developments has been assessed in **Chapter 9 Hydrology and Hydrogeology**. Following the implementation of the mitigation measures set out in **Section 9.7** there will be no significant effect on hydrology or hydrology from the Project.

The emissions from vehicle movements associated with the construction, operation and decommissioning of the Project (alone) and cumulatively will not have a significant effect on air emissions as detailed in **Chapter 12 Air & Climate - Section 12.2.6.**

"Tullagher Lough and Bog SAC (Sitecode=2343):-The IPCC have recently purchased 63.12ha of Kett's Lough located within the Tullagher Lough and Bog SAC for nature conservation and are working with the NPWS in regards to its management...

The Conservation Objectives for this site, published on www.npws.ie, describe nitrogen levels for Tullagher Lough & Bog SAC as exceeding its critical load of 5kg/ha/year and is near double this at 9.5kg/ha/year. This is affecting the species composition over time and needs to be reversed. Please assess the nitrogen impacts from the proposed development including the construction phase, operational phase and the decommissioning on all designated sites accumulatively with all other developments and practices in the area (such as agriculture which is the main source of nitrogen, road construction and traffic also need to be included)."

Response: The AA Screening concluded beyond reasonable scientific doubt, and in view of the best available scientific knowledge, that there is no potential for likely significant effects on the qualifying interests

¹ Global Construction Review (2025) Hundreds of Dutch power projects at risk over nitrogen confusion (<https://www.globalconstructionreview.com/hundreds-of-dutch-power-projects-at-risk-over-nitrogen-confusion/>) Accessed 24/04/2025]

or the Special Conservation Interests of the Tullagher Lough and Bog SAC, which is located at an approximate distance of 4 km from the proposed Project, as a result of the proposed Project when considered individually or in combination with other plans and projects. See the **Section 6.4.2** and the NIS for further detail.

"Bird Nesting Please ensure that all precautions are taken in regards to protecting ground nesting birds during the breeding season. It is also illegal to remove vegetation during the period from 1st March to 31st August in order to maintain biodiversity (Section 40 of the Wildlife Act 1976). Training should be given to construction workers to ensure that the laws regarding the cutting, grubbing, burning or destruction by other means to hedgerows/vegetation are adhered to."

Response: See mitigation measures set out in **Sections 6.5.6**.

BOCCI Bird surveys for species listed within the Birds of Conservation Concern in Ireland (Bird Red List) need to be conducted at the appropriate time of the year to ascertain possible disruption to behaviour or damage to breeding sites from construction works and operation of the proposed development.

Response: See mitigation measures set out in **Sections 6.5.6**.

"Fen Habitat: Please ensure that there is no loss of fen habitat due to the proposed development. IPCC assesses that there is only 21%[1] of the original extent of fen left in a conservation worthy condition so it is of upmost importance that it is protected from developments."

Response: There is no fen habitat within the Project footprint and there will be no loss of fen habitat associated with the Project.

"Curlew (Numenius aquata) The Curlew is one of the most endangered species in Ireland and the resident breeding population has declined by 98% since the 1980s (NPWS, 2022). The Curlew Conservation Programme (NPWS) is working to bring this species back from near extinction in Ireland and we would urge developers to liaise with them and BirdWatch Ireland in relation to any development. Breeding Curlew are site specific and will not possibly return if there are construction and operational disturbances from the proposed development. This needs to be scrutinized with ornithological surveys within the recommended survey times for breeding Curlew to ascertain as to whether they are present and if they utilise the site for any purposes such as foraging. The operational turbines may also affect the Curlew's local migration routes. It would be disastrous if this project was to contribute to the further decline of this nearly extinct species"

Response: While the study area could potentially support breeding curlew, there was no evidence from any of the baseline surveys of curlew breeding within the study area (there was only one on-site record of curlew during the baseline bird surveys). From the baseline information, it is considered that curlew is a rare visitor to the study area. See **Section 6.3.6** for more detail.

"Invasive Species The Irish Peatland Conservation Council appreciate that stringent measures are needed for a strong defence against the impacts of invasive species and implore developers to work with and prioritise an invasive species management plan which identifies established detrimental species within the

project area, describes actions to eradicate them and also plugs the gaps where the vectors for introduction may be identified. Please refer to www.NPWS.ie, National Biodiversity Action Plan 2017-2021 and the Irish Peatland Conservation Action Plan 2020 (www.ipcc.ie) for information regarding the need to control invasives."

Response: See Section 6.3.3.12, 6.4.9 and 6.5.7

6.2.6 Field Surveys

6.2.6.1 Habitats, vegetation and flora

The Site of the proposed Development was visited and walkover surveys of the habitats and flora were conducted on 24th May 2022, 25th October and 12th September 2023.

The field survey was mainly concentrated in areas in which it is proposed to locate wind farm infrastructure. However, adjoining areas and especially the area of intact high bog both within and outside of the redline boundary were also surveyed.

For the Grid Connection cable route, the survey comprised a drive-over by car, with stops as required to review habitats and flora present alongside the road route.

The section of the Turbine Delivery Route along the local road (L6132), including the blade transfer area, was surveyed in October 2022 and in November 2023. As with the grid connection cable route survey, this comprised a survey by car, with stops as required to review habitats and flora present alongside the road and at watercourse crossing points. A walkover survey of the blade transfer area was carried out with focus on the margins of the conifer stands.

Habitats within the study area were classified in accordance with 'A Guide to Habitats in Ireland' (Fossitt 2000). The dominant plant species present in each habitat type were recorded during the field surveys. This is considered sufficient to allow accurate classification of the habitats present. The extents and details of classified habitats were recorded and mapped using GIS. Where relevant, linkages with the EU Habitats Directive classification system are given.

During the Site survey particular attention was paid to the possible occurrence of plant species listed in either the Flora (Protection) Order 2022 or the Irish Red Data Book (Curtis and McGough 1988). Vascular plant species nomenclature in this report follows Stace (2010) while that of mosses follows Smith (2004).

During the surveys, a search for Invasive Alien Species (IAS) listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 – 2021 was conducted². Invasive alien species which are widespread in Ireland, including Co. Clare, include Japanese knotweed *Reynoutria japonica*, Indian balsam *Impatiens glandulifera*, and rhododendron *Rhododendron ponticum*.

The mapping of habitats was assisted by the use of aerial photography (OSI Geohive & BING websites).

6.2.6.2 Terrestrial fauna

Multi-disciplinary walkover surveys were carried out on 25th October 2022, 13th September 2023, 26th February 2024 and 12th June 2024 in accordance with NRA guidelines on Ecological Surveying Techniques for Protected Flora and Fauna during the planning of National Road Schemes (NRA, 2009b).

The walkover surveys were designed to detect the presence, or likely presence, of all mammal species but with a focus on protected species such as badger *Meles meles* and otter *Lutra lutra*. Terrestrial mammal species were detected by direct observations and by search for signs, such as dwellings (e.g. setts), tracks or feeding signs.

At the Wind Farm Site, survey for badger was focused on hedgerows, treelines and areas of scrub within a distance of at least 100 m of the wind farm infrastructure. The areas were walked and checked for signs of badger presence, including setts, latrines, snuffle holes, prints, paths and tree scratching. It is noted that while there is no woodland within, or adjoining, the actual site for the wind farm, the proposed location for the blade set-down area (at Tullabrack East) is within commercial conifer plantation and had been surveyed for mammals in November 2023.

For otter, emphasis was placed on impact locations of rivers and stream courses within the Wind Farm Site. In practice, the only watercourse within the Project Site which has potential for supporting breeding otter is the section of the Moyasta River which skirts part of the northern boundary of the wind farm site and which is also crossed by the proposed grid connection route (crossing WC01 as described in **Chapter 9, Section 9.5.3**). The area surveyed for otter is shown in **Plate 6.1**. In addition, three watercourse crossings along the L6132 component of the TDR were assessed for otter potential in November 2023. The

² <http://Invasives.biodiversityireland.ie/>

otter survey involved a search for signs, such as spraints, prints, slides, trails and holts along both banks of the stream. In addition to the width of the stream, a 10 m riparian buffer (both banks) was considered to comprise part of the otter habitat (NPWS 2009). The dedicated otter survey followed the guidance as set out in NRA (2008) *Guidelines for the Treatment of Otters Prior to the Construction of National Roads Schemes*.

Habitats within the Wind Farm Site were evaluated for their potential to support breeding amphibians, namely the common frog *Rana temporaria* and the smooth newt *Lissotriton vulgaris*, as well as the common lizard *Zootoca vivipara*, with any sightings recorded whilst carrying out the habitat and mammal surveys.

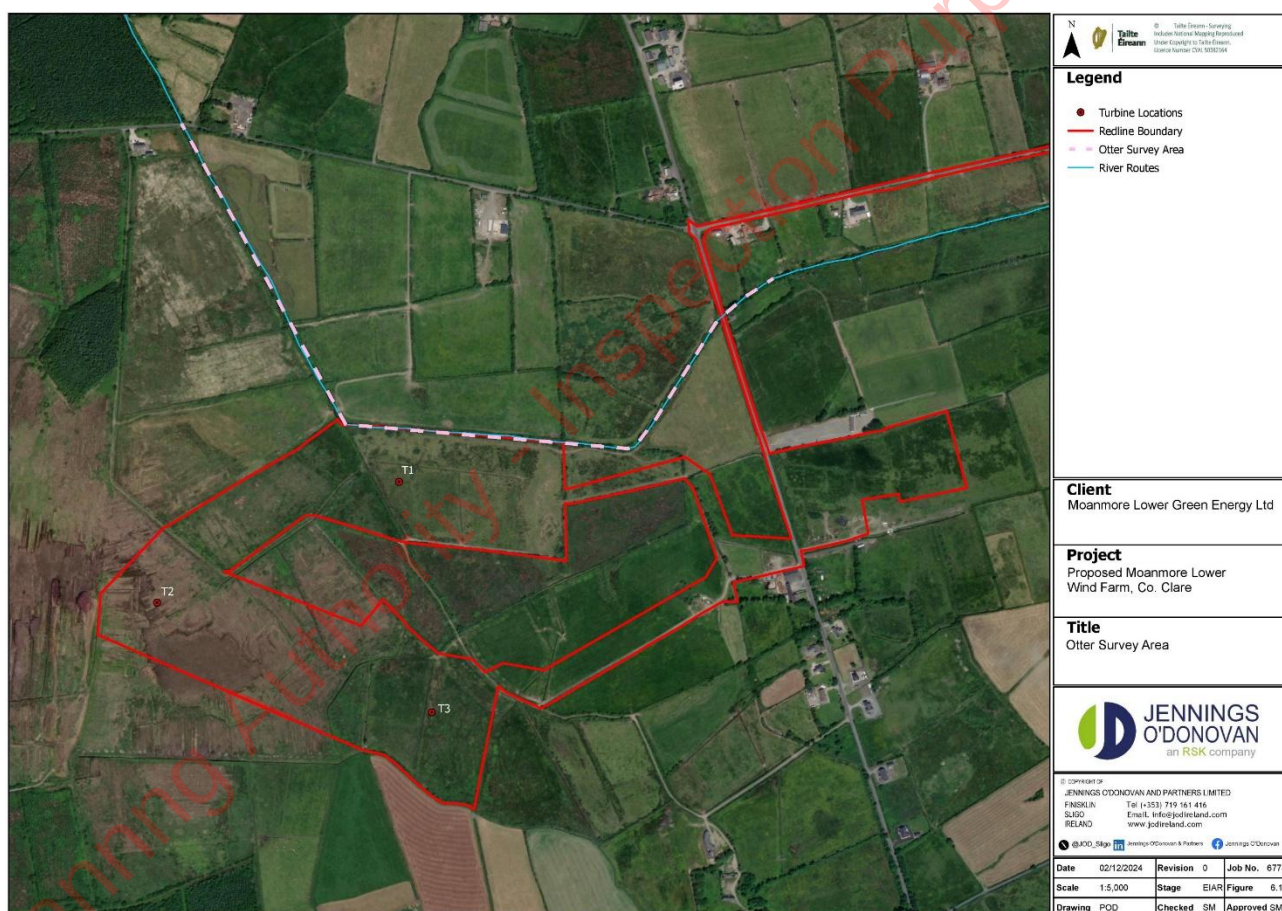


Plate 6.1. Otter survey area along the Moyasta River.

6.2.6.3 Bats

Full details of the methods used for the bat survey assessment are presented in **Appendix 6.2**. The following provides a summary of the methods (see **Plate 6.2** for geographical extent of bat survey):

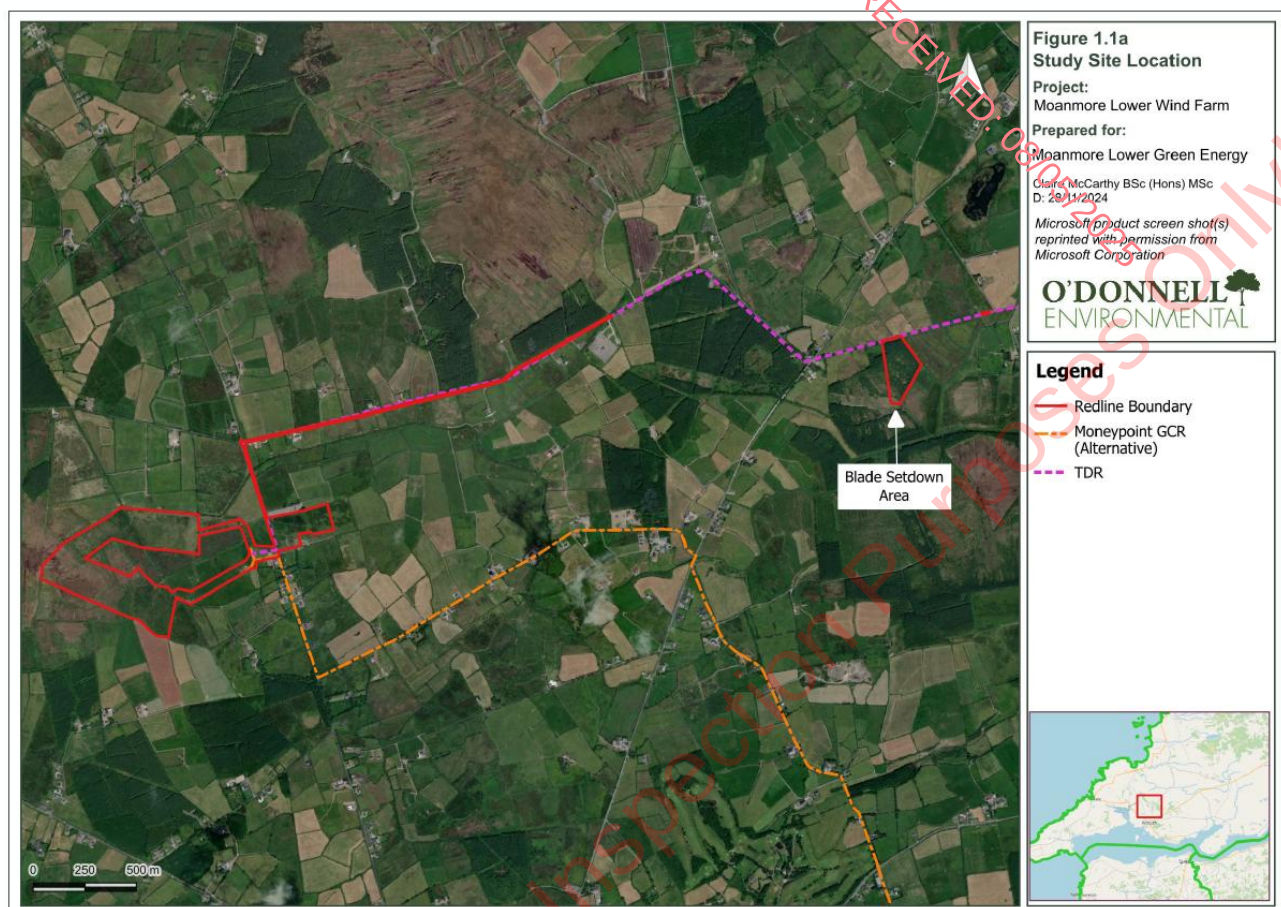


Plate 6.2. Bat survey area (map extracted from Appendix 6.2).

6.2.6.3.1 Potential roost assessment

Targeted surveys were carried out to determine the presence of bats or Potential Roosting Features (PRFs) where proposed works may impact a PRF directly or indirectly. Targeted day time surveys were carried out by Tom O'Donnell and Claire McCarthy on 12th September 2024 and 19th November 2024 to assess the potential of relevant features to support roosting by bats. Features inspected included bridges, buildings and trees. Of specific interest are sites which may support significant roosts such as maternity roosts, winter roosting sites and autumn swarming sites.

Potential roost assessment surveys were non-destructive, and relevant PRFs were visually inspected from ground level to identify any evidence of bat roosting. Further inspections of potential roosting features were carried out using a torch and endoscope and those at height were accessed using a 5 meter ladder where necessary and safely possible. Signs of bat use include bat droppings, feeding remains, potential bat access points identified by characteristic staining and scratches, noise made by bats etc.

The potential suitability of structures for roosting bats present at the proposed development site was classified according to the guidelines in Collins (2023) (see **Appendix 6.2, Table 2.1**). In relation to trees, Collins (2023) has moved away from the subjective approach used in Collins (2016) for categorising individual PRFs in trees. Collins (2023) acknowledges the subjectivity of the previous approach, and the many constraints associated with surveying trees for bats. The preliminary ecological appraisal, now termed the Daytime Bat Walkover (DBW), of trees present on site follows the categorisations scheme as outlined in **Appendix 6.2, Table 2.2**.

In line with Marnell *et al.* (2022), a risk-based approach was adopted in relation to survey of individual trees for the presence of PRFs. Marnell *et al.* (2022) recommends a risk-based approach, in which trees with a high probability of use by bats should be subject to survey. Factors listed as increasing the probability of trees being used by roosting bats include ancient woodland, large trees with complex growth form, visible damage etc. Factors listed as decreasing the probability of trees being used by roosting bats include “coniferous plantation with no specimen trees” and “young trees with simple growth form and little damage”.

NatureScot (2021) recommends that key roosting features which could support maternity roosts and significant hibernation and / or swarming sites on the wind farm site be identified in a search area extending to 200 m plus one rotor radius from the “site boundary”. The potential for significant roosts was also investigated within an area extending to a minimum of 268 m from the ‘redline’ boundary (as it relates to turbines). Features considered included bridges, culverts, buildings and trees.

In an Irish context, significant roosts are typically associated with man-made structures and underground features such as caves and mines. Information on known mines and caves was identified through the examination of publicly available information produced by Geological Survey Ireland.

6.2.6.3.2 Bat activity surveys

Bat activity at the proposed wind farm site was investigated through the use of passive bat detection.

Active transect surveys were not considered warranted at the proposed wind farm site due to the nature of the habitats present and the low likelihood of encountering a significant roost proximal to the proposed turbine locations. It is considered that sufficient coverage

was achieved for habitats locally through the use of passive detection to evaluate the likely importance of the study area and its immediate environs to bats.

In order to inform an assessment of the likely impacts of the proposed wind energy development on bats, surveys were carried out to characterise the importance of the habitats and features within the relevant survey area. An ultrasonic detector survey was carried out at the site to record bat activity in the area from which information on species composition, relative abundance and landscape usage could be derived. This multi-season passive detector survey was carried out from spring 2023 until autumn 2024 following NatureScot (2021) guidelines, with modifications for an Irish context, and NIEA Guidance (2022).

Passive bat detectors were deployed at three monitoring stations within the wind farm site for three seasonal periods in 2023 and three seasonal periods in 2024, to record general bat activity in locations corresponding to the proposed design available at the time of deployment. The locations of detectors deployed are provided in **Table 6.4** below. Full details of the survey periods are presented **Appendix 6.2, Table 2.5**.

Table 6.4: Passive Bat Monitoring Survey Locations

Year	Ref.	Latitude	Longitude
2023	Bat_01 (proxy)	52.665598	-9.511286
	Bat_02	52.662857	-9.517036
	Bat_03	52.661315	-9.510525
2024	Bat_01	52.664937	-9.510903
	Bat_02	52.662806	-9.517123
	Bat_03	52.661302	-9.510564

Individual bats of the same species cannot be distinguished by their echolocation alone and therefore 'bat registrations' are used as a measure of activity. A bat registration is defined as the presence of an individual species echolocation within a recording of maximum 15 seconds duration. All bat registrations recorded during this study follow these criteria, allowing comparison between monitoring stations.

A Davis 'EnviroMonitor' weather monitoring station was erected at a suitable location (52.662339, -9.510374), which was considered to record weather conditions representative of those at the proposed site. Relevant parameters (temperature, wind speed, rainfall) were to

demonstrate that weather conditions on each survey night were suitable, as set out in the NIEA (2022).

Monitoring periods follow guidance in NatureScot (2021) and NIEA (2022). The minimum number of good-weather survey nights for each of the three seasonal surveys was:

- Spring - 10 nights
- Summer - 20 nights
- Autumn - 10 nights

Although commonly applied in Ireland, the NatureScot (2021) guidelines 'Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation' were written for a Scottish context. While survey effort and design are carried out according to the guidelines in this study, the guidelines were adapted to an Irish context (see details in **Appendix 6.2**).

6.2.6.3.3 Data analysis

Species identification was aided by sonogram analysis using Wildlife Acoustics' Kaleidoscope Professional software (v. 5.4.8) and British Trust for Ornithology (BTO) 'Acoustic Pipeline' sound analysis tool. Automatic identifications were manually verified following the parameters set out in Russ (2012; 2021) and Middleton *et al.* (2014).

6.2.6.4 Birds

Initial recce walkovers were carried out at the proposed Development Site in October 2020 to assist in determining the scope and extent of the surveys. Field surveys were undertaken by Malachy Walsh and Partners (MWP) from October 2020 to August 2022. Further surveys were carried out from October 2022 to March 2024 by the Irish Ornithological Survey Group (IOSG) to ensure up-to-date information is available. All surveys were undertaken in accordance with Scottish Natural Heritage 2017 (now NatureScot) Guidance.

The field surveys comprised two main elements: vantage point (VP) surveys to gather flight data for target species, and targeted distribution and abundance surveys undertaken to gain an understanding of the bird species occurring in the area which may be subject to impacts from the development.

6.2.6.4.1 Vantage point surveys

Vantage point (VP) surveys were carried out on a monthly basis between October 2020 and March 2024 for a total of seven seasons (see below). Full details of the vantage point surveys are given in **Appendices 6.5 to 6.8**. The overall aim of these surveys was to quantify the level of target species flight activity within the flight activity survey area so as

to allow the calculation of Collision Risk. The flight activity survey area was taken to be that area encompassing the potential Development area, extending out to a distance of approximately 500 m beyond the Redline Boundary.

Season 1. Winter 2020-21	October 2020 to March 2021
Season 2. Summer 2021	April to September 2021
Season 3. Winter 2021-22	October 2021 to March 2022
Season 4. Summer 2022	April to September 2022
Season 5. Winter 2022-23	October 2022 to March 2023
Season 6. Summer 2023	April to September 2023
Season 7. Winter 2023-24	October 2023 to March 2024

One vantage point (VP1) was selected in October 2020 to provide coverage of the proposed Wind Farm Site. This was surveyed throughout the study period, with a second vantage (VP2) surveyed from October 2022 to March 2024.

Six hours of vantage point watches were completed at each vantage point in each month surveyed, amounting to totals of 252 hours at VP1 and 108 hours at VP2 across the survey period (3 summer & 4 winter seasons).

The locations of the vantage points, the development area, and the 500 m buffer zone around the development area are shown in **Plate 6.3**³. A viewshed analysis was carried out and is shown at 20 m above ground level in **Plate 6.4**.

Table 6.5: Vantage point locations at the Site.

VP No.	Latitude, Longitude
1	X (ITM):498224, Y (ITM): 657935
2	X (ITM): 496561. Y (ITM): 657606

During VP surveys the flight behavior of target species was recorded. At the time of each species observation the following information was recorded:

- The time that the bird was detected
- The flight duration(seconds) within various flight height categories (0-20m, 20-50m, 50-100m, 100-180m and >180m)
- Sex and age of the bird(s) (adult/juvenile), where possible to determine

³ The Redline boundary shown in Plate 6.3 reflects the 'Site' at the commencement of bird surveys in 2020. Since then the Redline boundary has been adjusted (see Chapter 1 Introduction, Figure 1.2) to reflect the potential buildable area. However, the adjusted boundary is still within the viewsheds of the two Vantage Points.

- Type of activity/behavior such as hunting, flying, displaying etc.
- Estimation of actual flight height
- Habitat(s) where the bird was observed
- Weather conditions at time of sighting including wind speed, direction, degree of visibility.

Once an initial sighting was made, each target or secondary species was observed until lost from view, with the flight line mapped on enlarged Discovery series maps. During the VP surveys, all other non-target/secondary species were also recorded, where recording did not infringe on recording of target species flight data.

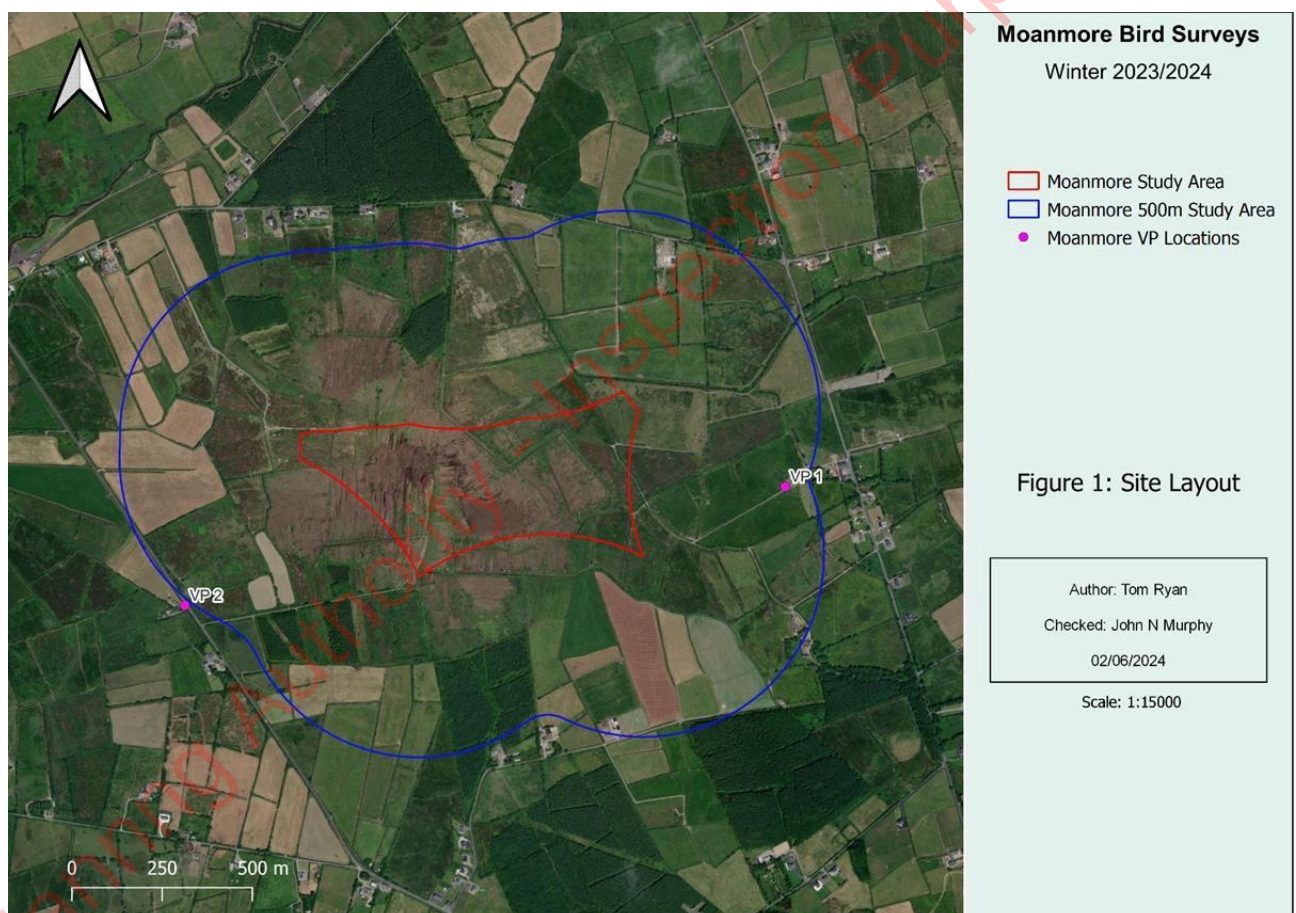


Plate 6.3. Locations of Vantage Points, redline boundary as used for bird surveys, and extent of 500 m buffer zone (map extracted from Appendix 6.8).

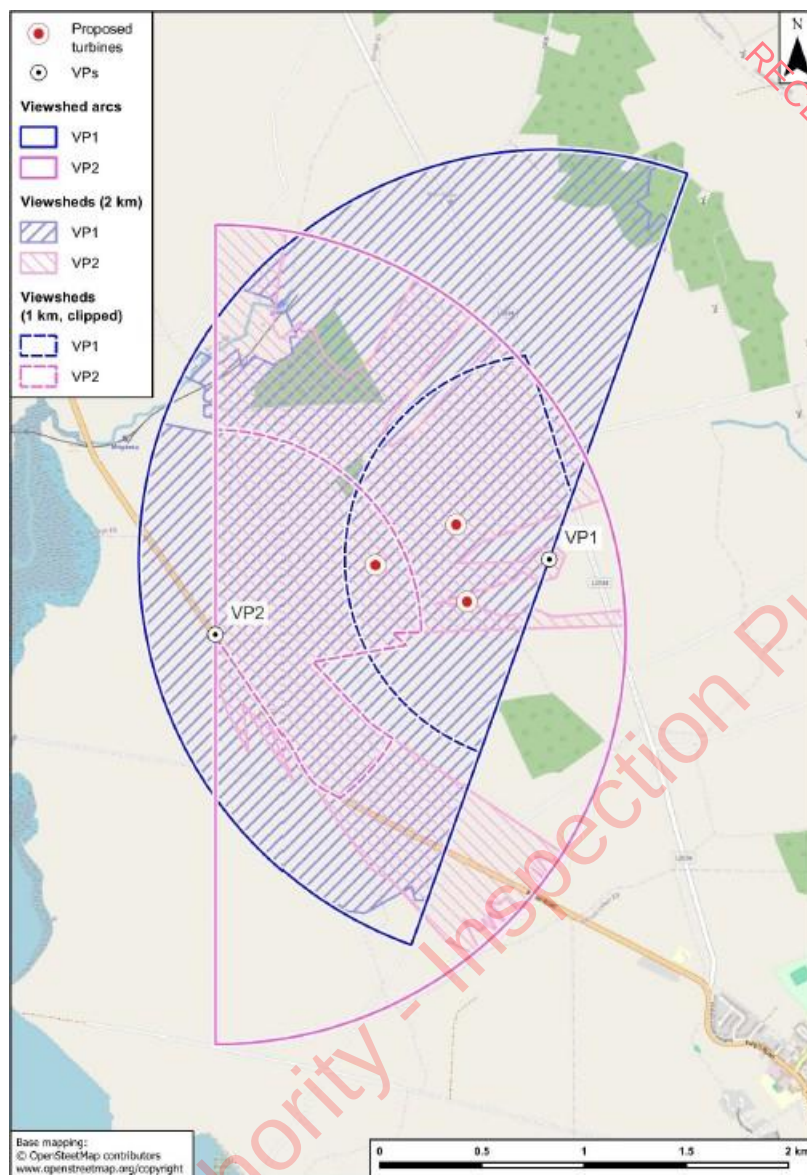


Plate 6.4. Viewsheds from each vantage point mapped at 20 m above ground level (map extracted from Appendix 6.10).

6.2.6.4.1 Distribution and abundance surveys

The distribution and abundance surveys comprised the following:

- Transect surveys
- Hen harrier roost survey
- Hen harrier breeding survey
- Breeding raptor survey
- Breeding wader survey
- Breeding woodcock survey
- Winter woodcock survey
- Barn owl survey
- Hinterland surveys

- Wintering wildfowl surveys

Transect survey

A transect survey is a survey along a defined route within the study area. The overall aim of the transect surveys was to assess general bird distribution throughout the Site and gather data on bird usage of the Site. Transect surveys were completed for breeding birds in summer 2023 (May & July) (see **Appendix 6.7**) and for wintering birds in winters 2022/23 (November, January, March) and 2023/24 (December, February) (see **Appendices 6.6 & 6.8**).

Three transect routes (A-C) were selected to provide representative coverage of habitats occurring within the 500 m study area (see **Plate 6.5**). Survey methods were adapted from the Countryside Bird Survey (CBS) (Birdwatch Ireland, 2012).

During each transect survey, all passerine species and target species seen or heard, typically within 100 m of the route, were recorded, although the topography of the landscape often allowed for the detection of birds at much greater distances.

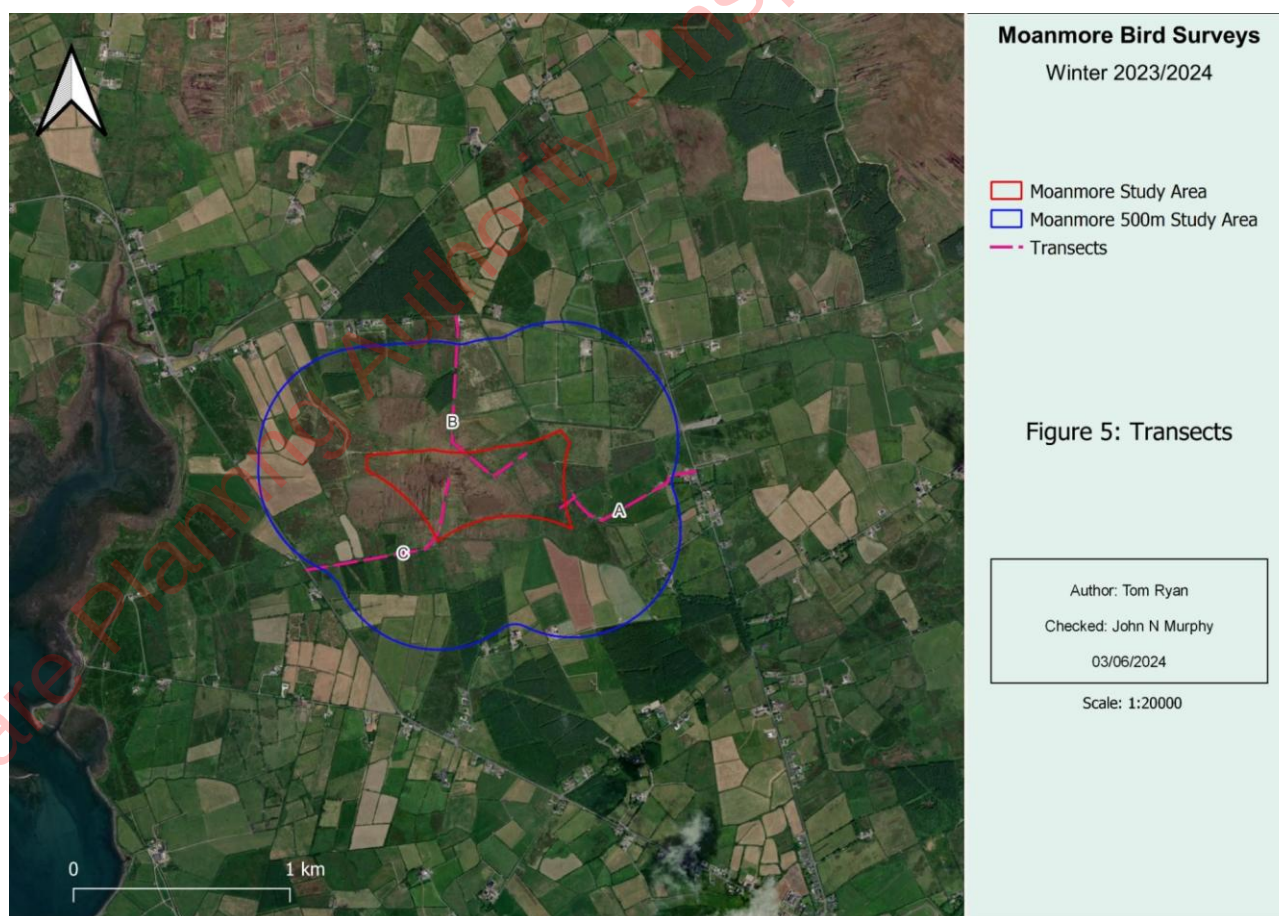


Plate 6.5. Locations of Transect Routes (A – C) (map extracted from Appendix 6.8).

Hen harrier winter roost survey

Hen harrier winter roost surveys were carried out to monitor the suitable roosting habitat within at least a 2 km distance of the site boundary, as per guidance by SNH (2017). Known roost sites out to a 5 km distance were also monitored (see **Plate 6.6**). Survey methodologies were adapted from published guidance by O'Donoghue (2019), Hardey *et al.* (2013), and Gilbert *et al.* (1998). The roost surveys were carried out in winters 2022/23 and 2023/24.

In winter 2022/23, surveys were carried out monthly on ten dates between 23rd November 2022 and 8th March 2023. All surveys were in the afternoon/evening period.

In winter 2023/24, surveys were carried out on seven dates between 6th October 2023 and 13th March 2024. All surveys were in the afternoon/evening period.

Full details of the surveys are included in **Appendices 6.6 & 6.8**.

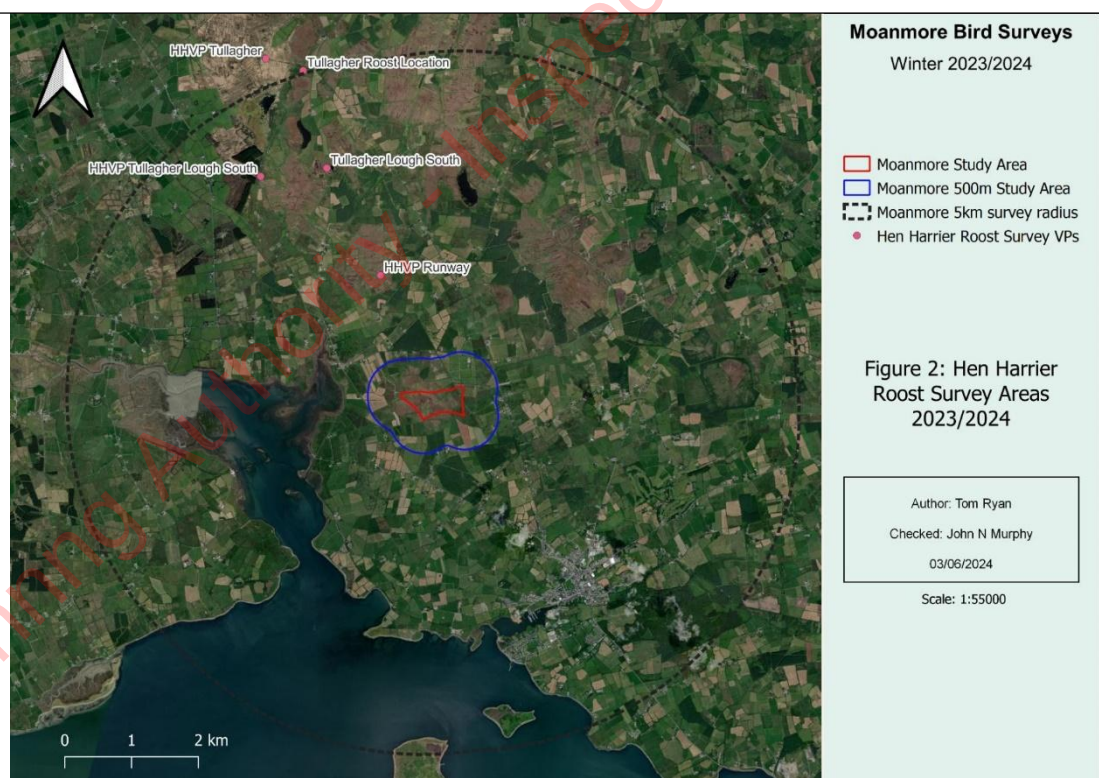


Plate 6.6. Locations of Hen Harrier Winter Roost survey locations (map extracted from Appendix 6.8).

Hen harrier breeding survey

Suitable hen harrier breeding habitat within a radius of approximately 5 km of the study site were surveyed for the presence of breeding behaviour during the breeding season in 2023

(see **Plate 6.7**). Surveys were carried out between 3rd April and 8th July. Methods followed were those described in Hardey *et al.* (2013). Full details, including survey locations, are included in **Appendix 6.7**.



Plate 6.7. Locations of Hen Harrier Breeding Survey locations (map extracted from Appendix 6.7).

Breeding raptor survey

Bird of prey species were surveyed in accordance with the methods described by Hardey *et al.* (2013). Suitable breeding habitat extending to a distance of approximately 2 km from the development boundary were visited during May, June and July 2023. Full details, including survey locations, are included in **Appendix 6.7**.

Breeding wader survey

Wader surveys were carried out in May and June 2023 within the 500 m study area (see **Plate 6.8**). Three visits were made to the most suitable areas for these species. The visits were made in addition to the standard transect surveys described above. The survey method was adapted from the O'Brien and Smith methodology for censusing lowland

breeding wader populations (as described in Gilbert *et al.* 1998). Full details are included in **Appendix 6.7**.

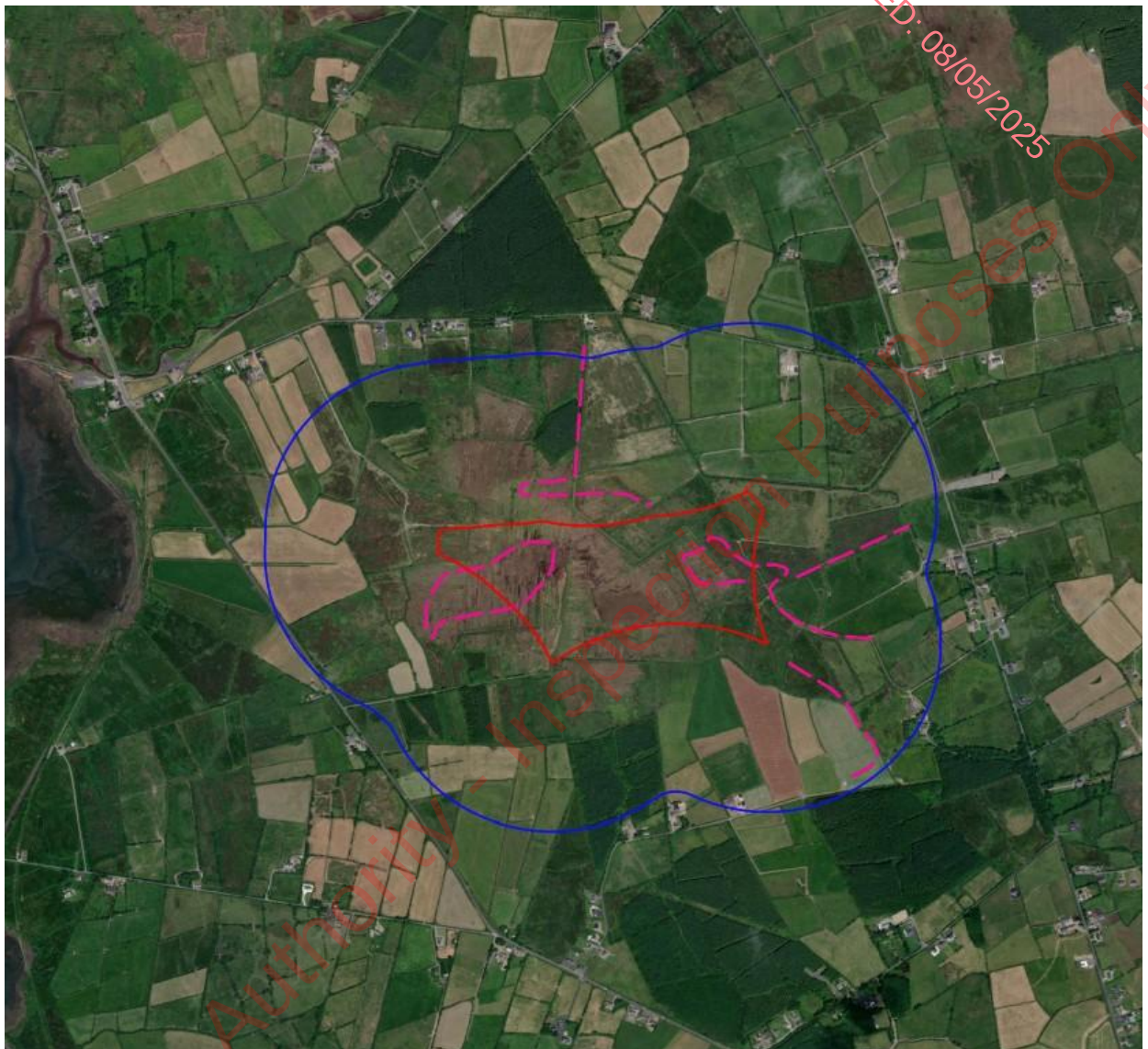


Plate 6.8. Locations of Breeding Wader and Woodcock Transect locations (map extracted from Appendix 6.7).

Breeding woodcock survey

Surveys for breeding woodcock were carried out in April and May 2023 within the 500 m study area (see **Plate 6.8**). The survey method was as described in Gilbert *et al.* (1998) and the British Trust for Ornithology (2013). The aim of the surveys was to detect the presence of displaying males over areas of suitable habitat. Full details are included in **Appendix 6.7**.

Winter woodcock survey

A survey for wintering woodcock was carried out on 9th November 2023 between 15:00 and 18:00 hrs. The survey location was within suitable habitat approximately 2 km from the wind farm (see **Plate 6.9**). Full details are included in **Appendix 6.8**.

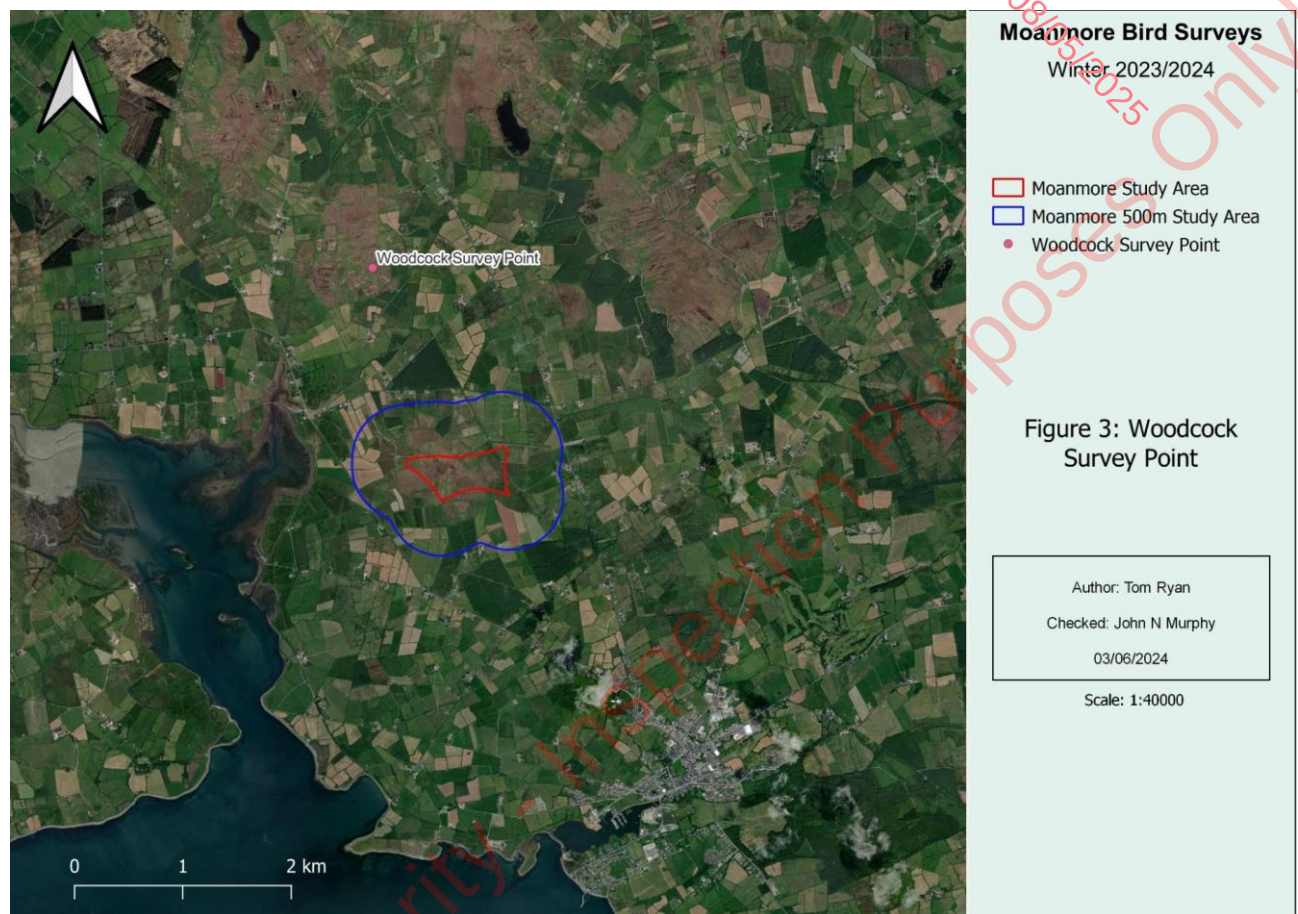


Plate 6.9. Locations of Woodcock Winter survey (map extracted from Appendix 6.8).

Barn owl survey

An initial survey for barn owl was carried out on 18th April 2023 (08:10 – 13:15 hrs), with a follow-up survey on 13th June 2023 (21:20 – 00:15 hrs). The survey examined potentially suitable buildings for breeding or wintering owls within an approximate distance of 1 km of the wind farm Site. Survey was in accordance with survey guidelines issued by T.I.I. and BirdWatch Ireland (BirdWatch Ireland, 2021). Full details of the barn owl survey are given in **Appendix 6.9** and discussed further in **Section 6.3.6.2.10** below.

On the April visit, searches were made where possible in all suitable and accessible buildings, for signs of the presence of barn owls - moulted feathers, pellets, or whitewash.

The June visit was made to confirm the presence or otherwise of nesting barn owl at a stone barn site where the presence of owls had been confirmed in April. On this evening/night

visit, the site was approached quietly on foot, and an initial search was made of the barn to check for presence of owls or any fresh signs since the April visit. A thermal imaging camera – an Axion 2 LRF – was used during the survey.

Hinterland survey

Car-based (driven) surveys of the hinterland surrounding the proposed Development Site to approximately 5 km radius, were carried out in April and November 2021 (see **Appendix 6.4, Figure 2**) and in winter 2022/23 (two surveys in the winter – see **Appendix 6.6**) (see **Plate 6.10**). A systematic approach was used where a consistent road transect was surveyed where all target species were recorded from suitable vantage points along the route. Habitats surveyed ranged broadly from farmland, waterbodies, rough grassland and woodland.

The purpose of the hinterland surveys was to gain a better understanding of the birds utilising surrounding habitats outside of the Site and to gather data on those species frequenting the region which may or may not traverse the Site.

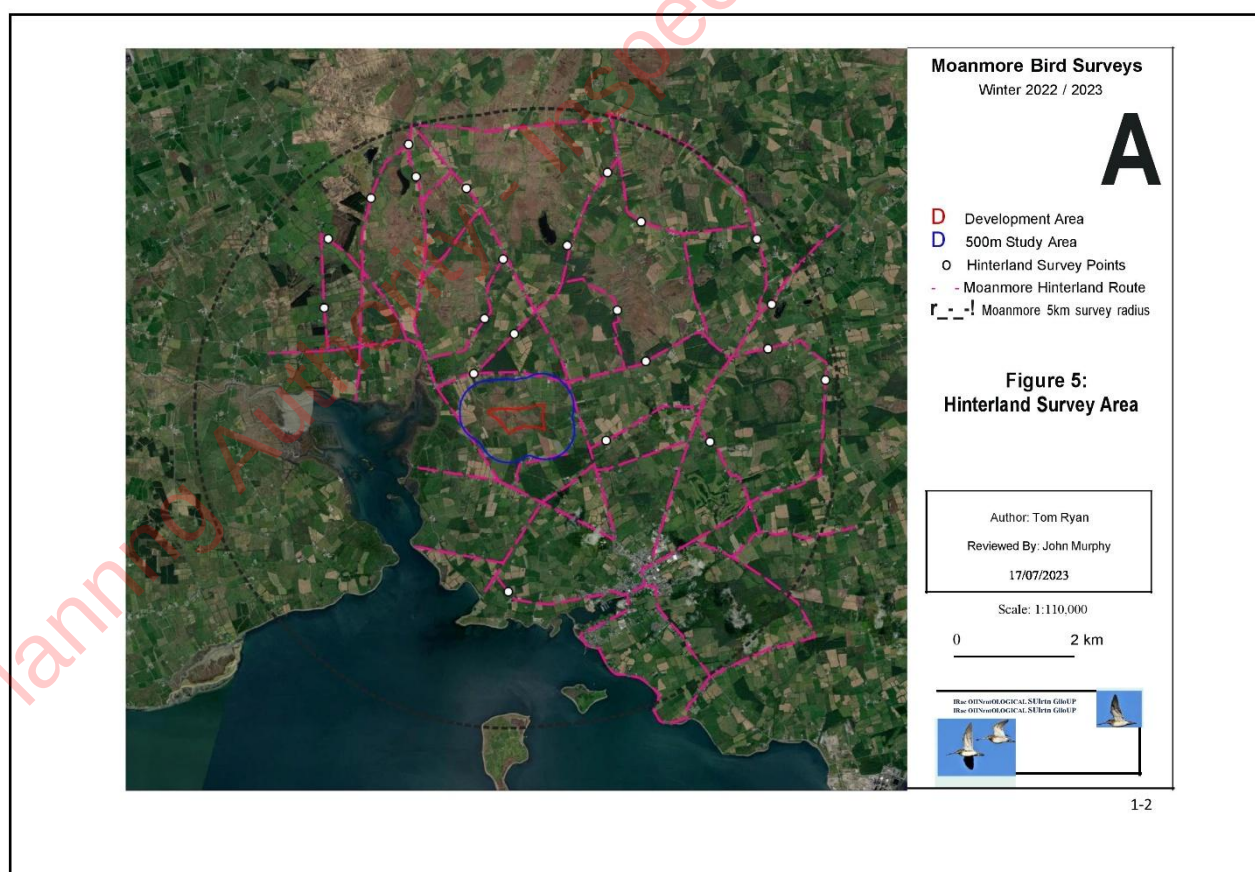


Plate 6.10. Locations of Hinterland bird survey routes (map extracted from Appendix 6.8).

Wetland bird survey

Wetland surveys were carried out to monitor the distribution and abundance of wintering wetland bird populations at selected locations (see **Plate 6.11**).

In 2021, Moyasta Creek was surveyed on 1st September and 8th November, with one survey at Tullabrack Lough on 3rd November.

More detailed surveys were carried out in winters 2022/23 and 2023/24, with focus on Poulnasherry Bay and sections of the Shannon estuary between Knock and Kilrush. Also, surveys were carried out at Clonderlaw Bay (1 survey), Moanmore Lough (1 survey) and Tullabrack Lough (6 surveys). The survey methodology was based on Birdwatch Ireland's I-WeBS methodology (Bibby *et al.* 2000). In these surveys, all target species were counted. Habitats surveyed included all suitable foraging and roosting areas for wetland birds within the survey area.

Poulnasherry Bay, three survey locations:

Winter 2022/23: surveys on 11/10/22, 16/01/23, 15/03/23

Winter 2023/24: surveys on 11/12/23, 09/01/24, 16/02/24, 06/03/24

Knock to Kilrush shoreline, seven survey sections:

Winter 2022/23: surveys on 12/10/22, 07/11/22, 07/12/22, 12/01/23, 07/02/23, 02/03/23

Winter 2023/24: surveys on 15/12/23, 08/01/24, 10/02/24, 04/03/24

Clonderlaw Bay: 07/02/23

Moanmore Lough: 06/01/23

Tullabrack Lough: 03/02/23, 03/03/23, 11/10/23, 03/11/23, 04/12/23, 02/01/24

These surveys provide information on the distribution and abundance of wetland bird species within the wider region. Full details are included in **Appendices 6.5, 6.6 & 6.8**.

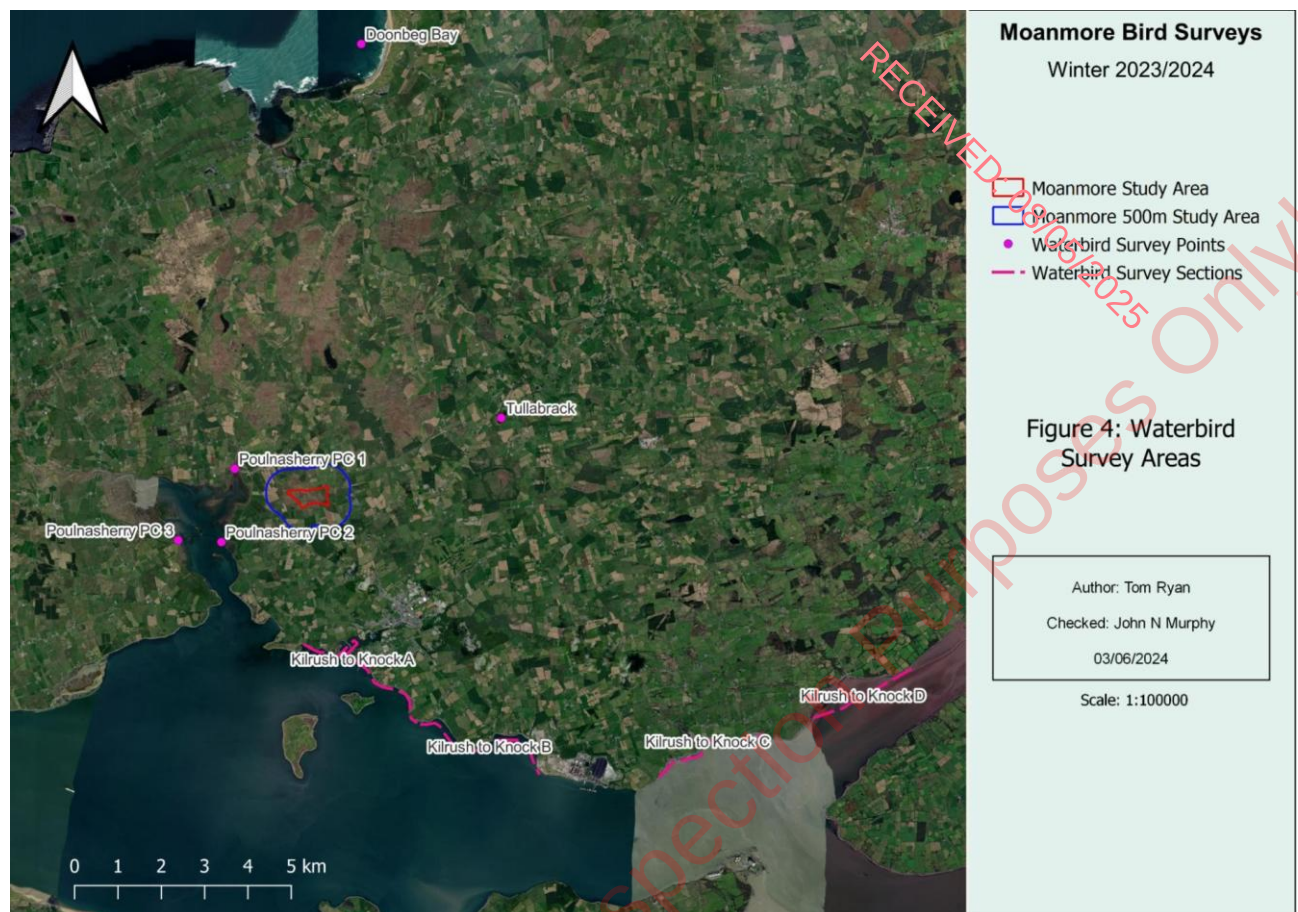


Plate 6.11. Locations of Winter Wetland Birds survey areas (map extracted from Appendix 6.8).

6.2.6.5 Marsh Fritillary

An area of grassland classified as Molinia meadow was identified during the botanical survey as having potential to support marsh fritillary *Euphydryas aurinia* due to the frequency of devil's-bit scabious *Succisa pratensis*, the food plant of the butterfly. The area essentially comprised a field where the proposed T3 turbine is to be located (latter along western boundary) (see **Plate 6.12**).

A survey for the butterfly was carried out on 27th September 2023 by two experienced ecologists from Jennings O'Donovan & Partners, Dr. Monica Sullivan and Ryan Mitchell. This comprised a preliminary marsh fritillary larval web survey and habitat condition assessment in accordance with the National Biodiversity Data Centre (NDBC) Guidelines⁴. The survey also included any other lepidoptera species present on site.

Full details of the survey methodology are contained in **Appendix 6.3**.

⁴ <https://biodiversityireland.ie/surveys/marsh-fritillary-monitoring-scheme/> [Accessed: 31st October 2023]



Plate 6.12. Location of Marsh Fritillary survey area (marked in blue) (map extracted from Appendix 6.3).

6.2.6.6 Survey Limitations

The information provided in this assessment accurately describes the baseline ecological environment within the area of the Proposed Development, including the Grid Connection Route and the relevant sections of the Turbine Delivery Route.

The specialist surveys, analyses and reporting have been undertaken in accordance with the appropriate guidelines and within the recommended seasonal time periods.

It is concluded that no technical difficulties were encountered during the baseline surveys.

6.2.7 Assessment Approach

The ecological evaluation approach used in this report is based on “Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA 2009). The impact assessment approach is based on “Guidelines on the information to be contained in Environmental Impact Assessment Reports” (EPA 2022).

6.2.7.1 Key ecological receptors

Ecological receptors can be important for a variety of reasons and the rationale used to identify them is explained in the text. Importance may relate, for example, to the quality or

extent of the Site or habitats therein; habitat and/ or species rarity; the extent to which such habitats and/ or species are threatened throughout their range, or to their rate of decline.

6.2.7.2 Determining importance of ecological receptors

The importance of an ecological receptor is considered within a defined geographical context. The following frame of reference has been used in this case (based on NRA Guidance 2009), relying on known/ published accounts of distribution and rarity where available, and professional experience:

- International and European
- National
- County
- Local Importance (higher value)
- Local Importance (lower value)

The above frame of reference is applied to the ecological receptors identified during the desk study and baseline surveys to inform this report.

The value of habitats and flora has been measured against published selection criteria where available. Examples of relevant criteria include habitats listed on Annex 1 of the Habitats Directive as amended and flora species listed on the Flora (Protection) Order 2022 or on the Irish Red List (Curtis & McGough).

In assigning a level of value to a species, it is necessary to consider its distribution and status, including a consideration of trends based on available historical records. Reference has therefore been made to published lists and criteria where available. Examples of relevant lists and criteria include: species of European conservation importance (as listed on Annexes II, IV and V of the Habitats Directive (as amended) or Annex 1 of the Birds Directive (as amended)), Birds of Conservation Concern in Ireland, species protected under the Wildlife Acts as amended etc.

For the purposes of this report ecological receptors of Local importance or greater, and/or subject to legal protection, have been subject to detailed assessment. Effects on ecological receptors rated Local Importance (lower value) are not likely to have significant effects.

6.2.7.3 Characterisation of Impacts and Effects

The impact assessment process involves the following steps:

- identifying and characterising likely significant effects;

- incorporating measures to avoid and mitigate (reduce) these effects;
- assessing the significance of any residual effects after mitigation;
- identifying appropriate measures to offset significant residual effects (if required); and
- identifying opportunities for ecological enhancement.

When describing impacts, reference has been made to the following characteristics, as appropriate (in accordance with EPA 2022):

- Positive or negative;
- Extent;
- Magnitude;
- Duration;
- Timing;
- Frequency; and
- Reversibility.

The impact assessment process considers both direct and indirect effects: direct ecological impacts are changes that are directly attributable to a defined action, e.g., the physical loss of habitat during the construction process. Indirect ecological impacts are attributable to an action, but which affect ecological resources through effects on an intermediary habitat process or feature, e.g. the construction of a Site access track which causes local hydrological changes, which, in the absence of mitigation, could lead to the drying out of peat bog. Also, a new track could lead to fragmentation of habitats and possible effects on associated flora and fauna.

Consideration of conservation status is important for evaluating the effects of impacts on individual habitats and species and assessing their significance:

- **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.

6.2.7.4 Significant Effects

The concept of ecological significance is addressed in paragraphs 5.24 through to 5.28 of CIEEM guidelines. Significance is a concept related to the weight that should be attached to effects when decisions are made. For the purpose of ecological impact assessment, a

'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 and the scale of significance of an effect may or may not be the same as the geographic context in which the feature is considered important.

The EPA Guidelines on information to be included in Environmental Impact Assessment Reports (EPA 2022) were adhered to when determining significance and the present assessment is in accordance with those guidelines. Details of the EPA Guidelines, including the criteria used for determining the significance of effects, are presented in **Chapter 1: Introduction**.

6.2.7.5 Cumulative Effects

Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location. Cumulative effects can occur where a proposed development results in individually insignificant impacts that, when considered in-combination with impacts of other proposed or permitted plans and projects, can result in significant effects.

6.2.7.6 Avoidance, Mitigation, Offsetting and Enhancement

When seeking mitigation or solutions to offset likely effects, efforts should be consistent with the geographical scale at which an effect is significant. For example, mitigation or the offsetting of effects on a species population significant at a county scale should ensure no net loss of the population at a county scale. The relative geographical scale at which the effect is significant will have a bearing on the required outcome which must be achieved.

Where potentially significant effects have been identified, the mitigation hierarchy has been applied, as recommended in the EPA (2022) and CIEEM (2022) Guidelines. The mitigation hierarchy sets out a sequential approach beginning with the avoidance of impacts where possible, the application of mitigation measures to minimise unavoidable impacts and then compensation for any remaining impacts. Once avoidance and mitigation measures have been applied residual effects are then identified along with any necessary compensation measures, and incorporation of opportunities for enhancement.

It is important for the impact assessment to clearly differentiate between avoidance mitigation, compensation and enhancement and these terms are defined here as follows:

- Avoidance is used where an impact has been avoided, e.g. through changes in scheme design;
- Mitigation is used to refer to measures to reduce or remedy a specific negative impact *in situ*;
- Compensation describes measures taken to offset residual effects, i.e. where mitigation *in situ* is not possible.
- Enhancement is improved management of ecological features or provision of new ecological features, resulting in a net benefit to biodiversity, which may be unrelated to a negative impact or is 'over and above' that required to mitigate/compensate for an impact.

6.3 BASELINE ECOLOGICAL CONDITIONS

6.3.1 Physical and General Ecological Description of Site

The proposed wind farm Site is located approximately 3 km northwest of the town of Kilrush, in west County Clare. It is within the townland of Moanmore Lower and is accessed from a local road to the east. The Grid Connection Route (GCR) will pass through the townlands of Moanmore Lower, Moanmore South and Tullabrack.

The proposed Development is situated within a landscape dominated by agricultural land (mainly used for livestock grazing) and with scattered stands of commercial conifer plantation. Remnant raised bogs, now almost entirely cut, are a feature of the area. There are a number of operational wind farms in the area, including Moanmore Wind Farm, located c. 1.7 km to the northeast and Tullabrack Wind Farm, located c. 2.16 km to the east of the Site.

From a conservation perspective, the River Shannon system is the dominant feature of the local area, with Poulmasherry Bay located approximately 1.5 km to the west of the Site. Various small lakes and wetlands occur in the hinterland of the Site, including Tullaher Lough, Tullabrack Lough, Gower Lough and Moanmore Lough.

As detailed in **Chapter 8, Section 8.3.3**, the mapped geological formation underlying most of the Site and GCR is the Gull Island Formation, which is a grey SILTSTONE with up to 20% sandstone towards the base decreasing upwards (see **Chapter 8: Figure 8.4** for details). Further east, at the proposed Blade Transfer Area and along the vertical

realignment area on the L6132, the area is underlain by Central Clare Group (CCG) which is interbedded mudstone, siltstone, sandstone of variable thicknesses.

Much of the Site is covered in peat, particularly in the western sector and at the turbine locations (refer to **Chapter 8: Figure 8.5** and **Appendix 8.1 PSRA**). As discussed in Section 4 of the PSRA peat depths at survey points (335 no. taken) ranged from 0.00 m to 5.1 m, though generally depths were very shallow to moderately deep. Deepest peats occurred south of T2 and south / southwest of T3. The peat depths in the Spoil Storage Area were very shallow to shallow, ranging from 0.0 m to 0.7m. The Blade Transfer Area, which is now afforested, had peat depths ranging from 3.5 m to 5.0 m.

The Site is characterised by relatively flat lying topography with associated elevations ranging between 8 to 16 m AOD and an average slope of 2.5°.

Regionally the wind farm Site, including the permanent spoil storage area, is located in the Shannon Estuary North surface water catchment within Hydrometric Area No. 27 of the Shannon Irish River Basin District (details in **Chapter 9: Hydrology and Hydrogeology**, and **Figure 9.1**)

More locally the wind farm Site is located in the Wood River sub-catchment (Wood_SC_010) and the Moyasta_010 WFD river sub-basin (see **Chapter 9, Figure 9.2**). The Moyasta River (EPA Code: 27M04) is mapped to flow to the northwest along the northern boundary of the wind farm Site, approximately 90 m north of the T1 location. This river discharges into the Mouth of the Shannon coastal waterbody, approximately 1.5 km northwest of the Site and flows out through Poulmasherry Bay into the Shannon Estuary.

The Grid Connection Route is also located in the Wood River sub-catchment (Wood_SC_010) and the Moyasta_010 WFD river sub-basin. There is 1 no. crossing over an EPA mapped watercourse along the GCR. This crossing is proposed over the Moyasta River along the L2034. An existing bridge is present at this location. All watercourses draining the GCR discharge into the Moyasta River.

The watercourses draining the Turbine Delivery Route work areas, including the blade set-down area, discharge into the Doonbeg River and Doonbeg Estuary in the Mal Bay Catchment and into the Moyasta River and Mouth of the Shannon coastal waterbody in the Shannon Estuary North catchment.

The section of the Moyasta River which flows along the northern boundary of the site has been dredged over the years and appears as a canalised watercourse. The natural drainage of the wind farm Site is further facilitated by an extensive network of manmade surface water drainage features. These features comprise of several deeply incised drains which flow to the north, draining the cutover bog and the rough agricultural lands which comprise the Site, before discharging into the Moyasta River.

The Aquatic Ecology impact assessment report (**Chapter 7**) describes the watercourses in the Moanmore Lower area as being characterised by slow flowing water, low discharge and muddy substrates, with moderate to poor water quality. The Moyasta River and the Doonbeg River systems are examples of Depositing/lowland river (FW2).

Ecologically, the Site for the proposed wind farm can be described as being dominated by Wet grassland (GS4) (semi-improved to varying extents) and Cutover bog (PB4), with a small area of Raised bog (PB1). The bog type is former raised bog of the 'Western' category. In a detail evaluation of raised bogs in Ireland, Cross (1990) refers to Co. Clare and writes *"Raised bogs occurred in two areas; small bogs in the undulating lowlands east of Tulla and an extensive tract near Kilrush at the mouth of the Shannon (Moanmore Bog). All bogs have been largely cut away leaving a few very small remnants behind."*

6.3.2 Designated Sites

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

Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) are designated under the EU Habitats Directive as amended and EU Birds Directive as amended respectively and are collectively known as 'European Sites' or 'Natura 2000' sites. The potential for significant effects on European Sites is fully assessed in the AA Screening Report and any adverse effects on integrity of those sites is fully assessed in the Natura Impact Statement that accompanies this application. As per 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"*. **Section 6.4.2** 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 of 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 Ecological Impact Assessment (EclA).

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 sites is fully considered in this EclA.

All designated sites that could potentially be affected were identified using a source-pathway-receptor model. To provide context for the assessment, European and national sites within a distance of approximately 15 km surrounding the Development Site have been considered and are shown in **Figures 6.1, 6.2 & 6.3** in Vol. III. The distance of 15 km follows guidance from the Department of Environment, Heritage and Local Government (2010) and would be a conservative distance in many cases. Sites that were beyond 15 km from the proposed Development were also considered and no potential for impact on any site was identified due to the absence of direct and indirect connections. Information on the identified sites according to the site-specific conservation objectives is provided in **Tables 6.6 and 6.7**.

No part of the Development Site is within an area, or adjoins an area, with a nature conservation designation. Sites with designations within a 15 km distance of the location of the proposed wind farm are listed in the following sections.

6.3.2.1 European designated sites

A total of eight European designated sites occur within a 15 km distance of the Site (see **Figures 6.1 and 6.2** in Vol III). These are listed in **Table 6.6**, along with the reasons for designation, the distance from the proposed Project area and whether any linkages or connectivity exist between the locations.

The nearest designated European sites to the Development are the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA. Both of these sites include Poulnasherry Bay (closest straightline distance 1.22 km), which receives drainage from the Moanmore Lower area via the Moyasta River.

The Carrowmore Dunes SAC and the Mid-Clare Coast SPA are connected to the Project area by two watercourse crossings along the TDR (L6132 section), which are upper

tributaries of the Doonbeg River. The Doonbeg River flows for approximately 13 km before entering Doonbeg Bay and the SAC and SPA (it is noted that the area of the Carrowmore Dunes SAC overlaps entirely with the Mid-Clare coast SPA).

For the other four listed sites, there are no ecological corridors or hydrological linkages with the Site for the proposed wind farm at Moanmore Lower. The European sites are considered in detail in the AA Screening Report and NIS which accompany this application and are summarised in **Table 6.6** below. The eight sites are as follows:

- Lower River Shannon SAC
- Tullaher Lough and Bog SAC
- Carrowmore Dunes SAC
- Carrowmore Point to Spanish Point and Islands SAC
- Kilkee Reefs SAC
- River Shannon and River Fergus Estuaries SPA
- Mid-Clare Coast SPA
- Illaunonearaun SPA

Table 6.6. Relevant European sites, reasons for designation, distances from Project Site and summary of connectivity.

European Site	Reasons for designation (information correct as of 6 th March 2025) (*denotes a priority habitat)	Distance from proposed Project and summary of connectivity
	SPECIAL AREAS OF CONSERVATION	
Lower River Shannon SAC (site code 002165)	• Sandbanks which are slightly covered by sea water all the time [1110] • Estuaries [1130] • Mudflats and sandflats not covered by seawater at low tide [1140] • *Coastal lagoons [1150] • Large shallow inlets and bays [1160] • Reefs [1170] • Perennial vegetation of stony banks [1220] • Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] • Salicornia and other annuals colonizing mud and sand [1310] • Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] • Mediterranean salt meadows (Juncetalia maritimi) [1410]	The proposed Wind Farm Site is located approximately 1.22 km (straight-line distance) to the east of the Poulinaherry Bay component of the SAC. The Wind Farm site has hydrological connectivity with the Lower River Shannon SAC via natural and artificial drainage that connect to the Moyasta River which drains the site. The Moyasta River enters Poulinaherry Bay approximately 2 km downstream of the wind farm site. The Grid Connection Route has one watercourse crossing over the Moyasta River at an existing bridge on the L2034.

European Site	Reasons for designation (information correct as of 6 th March 2025) (*denotes a priority habitat)	Distance from proposed Project and summary of connectivity
	- Water courses of plain to montane levels with the Ranunculus fluitans and Callitriche-Batrachion vegetation [3260] - Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinia caerulea) [6410] *Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnus incanae, Salix alba) [91E0] - Margaritifera margaritifera (Freshwater Pearl Mussel) [1029] - Petromyzon marinus (Sea Lamprey) [1095] - Lampetra planeri (Brook Lamprey) [1096] - Lampetra fluviatilis (River Lamprey) [1099] - Salmo salar (Salmon) [1106] - Tursiops truncatus (Common Bottlenose Dolphin) [1349] - Lutra lutra (Otter) [1355] According to this SAC's site Conservation Objectives document (Version 1.0. Department of Arts, Heritage and the Gaeltacht, 07 August 2012), for each of the listed Qualifying Interests, the Conservation Objective is to maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected.	The section of the Turbine Delivery Route (TDR) along the L6132 crosses three watercourses, two tributaries of the upper reaches of the Doonbeg River, the Tullagower River and the Brisla East Stream, and one on the Moyasta River. The Moyasta crossing (Gowerhass stream), is upstream of the Development Site. Hence, hydrological connectivity exists between the TDR component of the Project and the SAC. It is concluded that hydrological connectivity exists between the Project area and the SAC.
Tullagher Lough and Bog SAC (site code: 002343)	*Active raised bogs [7110] - Degraded raised bogs still capable of natural regeneration [7120] - Transition mires and quaking bogs [7140] - Depressions on peat substrates of the Rhynchosporion [7150] According to this SAC's site Conservation Objectives document (Version 1.0. Department of Arts, Heritage Regional, Rural & Gaeltacht Affairs, 6th December 2016) for each of the listed Qualifying Interests, the Conservation Objective is to maintain the favourable conservation condition of the Annex I habitats and/or the Annex II species for which the SAC has been selected.	The Wind Farm Site and the Grid Connection Route are each located approximately 4 km southeast of the SAC. There are no ecological corridors or hydrological connectivity between the two areas. The Turbine Delivery Route does not pass any watercourse associated with the Tullagher Lough and Bog SAC. It is concluded that there is no ecological or hydrological connectivity between the Project and the SAC.
Carrowmore Dunes SAC (site code:002250)	- Reefs [1170] - Embryonic shifting dunes [2110] - Shifting dunes along the shoreline with Ammophila arenaria (white dunes) [2120] *Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] - Vertigo angustior (Narrow-mouthed Whorl Snail) [1014]	The proposed Wind Farm Site and Grid Connection Route is approximately 8 km (straight-line distance) south of the SAC. There are no ecological corridors or hydrological connectivity between the wind farm site or the grid connection route and the SAC.

European Site	Reasons for designation (information correct as of 6 th March 2025) (*denotes a priority habitat)	Distance from proposed Project and summary of connectivity
	According to this SAC's site Conservation Objectives document (Version 1.0. Department of Arts, Heritage and the Gaeltacht, 4th March 2014) for each of the listed Qualifying Interests, the Conservation Objective is to maintain the favourable conservation condition of the Annex I habitats and/or the Annex II species for which the SAC has been selected.	The section of the TDR along the L6132 crosses three watercourses, two upstream of the Doonbeg River (Tullagower river & Brisla East stream) and one on the Moyasta River. The Doonbeg River flows in a west to northwest direction for approximately 13 km before entering Doonbeg Bay and the SAC. Hence, hydrological connectivity exists between the TDR component of the Project and the SAC. It is concluded that hydrological connectivity exists between the Project area and the SAC via the TDR.
Carrowmore Point to Spanish Point and Islands SAC (site code: 001021)	- Coastal lagoons [1150] - Reefs [1170] - Perennial vegetation of stony banks [1220] - Petrifying springs with tufa formation (Cratoneurion) [7220] According to this SAC's site Conservation Objectives document (Version 1.0. Department of Arts, Heritage and the Gaeltacht, NPWS 7th April 2014) for each of the listed Qualifying Interests, the Conservation Objective is to maintain the favourable conservation condition of the Annex I habitats and/or the Annex II species for which the SAC has been selected.	The proposed Wind Farm Site and Grid Connection Route is approximately 11 km south of the SAC. There are no ecological corridors or hydrological connectivity between the two areas. The Turbine Delivery Route does not pass any watercourse associated with the SAC. It is concluded that there is no ecological or hydrological connectivity between the Project and the SAC.
Kilkee Reefs SAC (site code 002264)	- Large shallow inlets and bays [1160] - Reefs [1170] - Submerged or partially submerged sea caves [8330] According to this SAC's site Conservation Objectives document (NPWS 6th August 2014, Conservation objectives for Kilkee Reefs SAC [002264]. Version 1.0. Department of Arts, Heritage and the Gaeltacht) for each of the listed Qualifying Interests, the Conservation Objective is to maintain the favourable conservation condition of the Annex I habitats and/or the Annex II species for which the SAC has been selected.	The proposed Wind Farm Site is approximately 9 km east of the SAC, while the Grid Connection Route is approximately 10 km east of the SAC. The Turbine Delivery Route does not pass any watercourse associated with the SAC. It is concluded that there is no ecological or hydrological connectivity between the Project and the SAC.
	SPECIAL PROTECTION AREAS	
River Shannon and River	- Cormorant (<i>Phalacrocorax carbo</i>) [A017] - Whooper Swan (<i>Cygnus cygnus</i>) [A038]	The proposed Wind Farm Site is located approximately 1.22 km (straight-line distance) to the east of

European Site	Reasons for designation (information correct as of 6 th March 2025) (*denotes a priority habitat)	Distance from proposed Project and summary of connectivity
Fergus Estuaries SPA (site code: 004077)	• Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] • Shelduck (<i>Tadorna tadorna</i>) [A048] • Wigeon (<i>Anas penelope</i>) [A050] • Teal (<i>Anas crecca</i>) [A052] • Pintail (<i>Anas acuta</i>) [A054] • Shoveler (<i>Anas clypeata</i>) [A056] • Scaup (<i>Aythya marila</i>) [A062] • Ringed Plover (<i>Charadrius hiaticula</i>) [A137] • Golden Plover (<i>Pluvialis apricaria</i>) [A140] • Grey Plover (<i>Pluvialis squatarola</i>) [A141] • Lapwing (<i>Vanellus vanellus</i>) [A142] • Knot (<i>Calidris canutus</i>) [A143] • Dunlin (<i>Calidris alpina</i>) [A149] • Black-tailed Godwit (<i>Limosa limosa</i>) [A156] • Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] • Curlew (<i>Numenius arquata</i>) [A160] • Redshank (<i>Tringa totanus</i>) [A162] • Greenshank (<i>Tringa nebularia</i>) [A164] • Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] • Wetland and Waterbirds [A999] According to this SPA's site Conservation Objectives document, Conservation Objectives Series: River Shannon and River Fergus Estuaries SPA 004077. Version 1.0, 17th September 2012, Department of Arts, Heritage and the Gaeltacht), for each of the listed SCIs, the Conservation Objective is to maintain the favourable conservation condition of the species for which the SPA has been selected. In recognition of wetland habitat, the Conservation Objective is: To maintain or restore the favourable conservation condition of the wetland habitat at River Shannon and River Fergus Estuaries SPA as a resource for the regularly occurring migratory waterbirds that utilise it.	the Poulmasherry Bay component of the SPA. The Wind Farm site has hydrological connectivity with the SPA via natural and artificial drainage that connects to the Moyasta River which drains the site. The Moyasta River enters Poulmasherry Bay approximately 2 km downstream of the wind farm site. The Grid Connection Route has one watercourse crossing over the Moyasta River at an existing bridge on the L2034. The section of the Turbine Delivery Route (TDR) along the L6132 crosses three watercourses, two tributaries of the upper reaches of the Doonbeg River, the Tullagower River and the Brisla East Stream, and one on the Moyasta River. The Moyasta crossing (Gowerhass stream), is upstream of the Development Site. Hence, hydrological connectivity exists between the TDR component of the Project and the SPA. The wind farm Site and other associated off-site areas within the red lined boundary, including blade transfer area, do not provide suitable ex-situ habitat to support any of the SCIs of the SPA other than curlew (there was only one on-site record of curlew during the baseline bird surveys). It is concluded that hydrological connectivity exists between the Project area and the SPA.
Mid-Clare Coast SPA (code 004182)	• Cormorant (<i>Phalacrocorax carbo</i>) [A017] • Barnacle Goose (<i>Branta leucopsis</i>) [A045] • Ringed Plover (<i>Charadrius hiaticula</i>) [A137] • Sanderling (<i>Calidris alba</i>) [A144] • Purple Sandpiper (<i>Calidris maritima</i>) [A148] • Dunlin (<i>Calidris alpina</i>) [A149] • Turnstone (<i>Arenaria interpres</i>) [A169] • Wetland and Waterbirds [A999]	The proposed Wind Farm Site and Grid Connection Route is located approximately 8 km south of the SPA. There are no ecological corridors or hydrological connectivity between the Site of the wind farm or the Grid Connection Routes and the SPA. The section of the TDR along the L6132 crosses three watercourses,

European Site	Reasons for designation (information correct as of 6 th March 2025) (*denotes a priority habitat)	Distance from proposed Project and summary of connectivity
	According to this SPA's site Conservation Objectives document, Conservation Objectives Series: Mid-Clare Coast SPA 004182. Version 1.0, 8th September 2014, Department of Arts, Heritage and the Gaeltacht), for each of the listed SCIs, the Conservation Objective is: To maintain the favourable conservation condition of the species for which the SPA has been selected. In recognition of wetland habitat, the Conservation Objective is: To maintain or restore the favourable conservation condition of the wetland habitat at Mid-Clare Coast SPA as a resource for the regularly occurring migratory waterbirds that utilise it.	two upstream of the Doonbeg River (Tullagower river & Brisla East stream) and one on the Moyasta. The Doonbeg river flows in a west to northwest direction for approximately 13km before entering Doonbeg Bay and the SPA. Hence, hydrological connectivity exists between the TDR component of the Project and the SPA. The wind farm Site does not provide suitable ex-situ habitat to support any of the SCIs of the SPA. It is concluded that hydrological connectivity exists between the Project area and the SAC via the TDR.
Illelaunonearaun SPA (code 004114)	Barnacle Goose (<i>Branta leucopsis</i>) [A045] According to the NPWS (2024) Conservation Objectives for Illelaunonearaun SPA 004114, Version 1. Department of Housing, Local Government and Heritage, the Objective is: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (as above).	The proposed Wind Farm Site and Grid Connection Route is located approximately 14 km east of the SPA. There are no ecological corridors or hydrological connectivity between the Site of the wind farm or the Grid Connection Routes and the SPA. The route of the TDR does not have connectivity with the SPA. The wind farm Site does not provide suitable ex-situ habitat to support any of the SCIs of the SPA. It is concluded that ecological or hydrological connectivity does not exist between the Project area and the SPA.

6.3.2.2 National designated sites

A single Natural Heritage Area (NHA) occurs within the 15 km radius of the Site (see **Figure 6.3** and **Table 6.7**), namely Cragnashingaun Bogs NHA. This is approximately 15 km to the northeast of the Site for the wind farm and there are no ecological corridors or hydrological linkages with the wind farm project area.

[It is noted that Illelaunonearaun is listed as an NHA (site code 001014) on the NPWS Designation Viewer – this appears to be an error as the site is a pNHA]

6.3.2.3 *Proposed designated sites*

A total of 13 proposed Natural Heritage Areas (pNHAs) occur within a 15 km radius of the Site (see **Figure 6.3** and **Table 6.7**).

The Poulnasherry Bay pNHA, which receives drainage from the Moanmore Lower area via the Moyasta River, is the site in closest proximity to the Site for the proposed wind farm (c.1.22 km).

While a further five of the sites (Clonderalaw Bay, Scattery Island, Tarbert Bay, Ballylongford Bay, Beal Point) are located within or along the Shannon system, and could theoretically receive water emanating from the Moanmore Lower site, it is considered that there is no realistic potential for these sites to be affected in any way by the proposed wind farm project in view of the vast dilution and dispersal that would occur within the Shannon estuary system (should contaminated run-off reach the estuarine system in absence of mitigation).

For the remaining listed pNHA sites, ecological or hydrological connectivity with the Site for the proposed wind farm has not been identified.

Table 6.7: Relevant sites designated under Irish legislation, reasons for designation, distances from subject site and summary of connectivity.

Site	Reasons for designation (information correct as of 6 th March 2025)	Distance from proposed Moanmore Lower wind farm site and summary of connectivity
NATURAL HERITAGE AREAS		
Cragnashingaun Bog NHA (site code: 0001382)	Peatlands (4)	The pNHA site is located approximately 14 km to the northeast of the wind farm Development Site. There are no ecological or hydrological linkages between the NHA and the wind farm Site.
PROPOSED NATURAL HERITAGE AREAS		
Derrygeeha Lough pNHA (site code 000050)	Not Stated but a small freshwater lake with good wetland plant communities and some adjoining cutover blanket bog. Of particular entomological importance as one of the few locations in Ireland for the caddisfly <i>Cyrtus insolutus</i> .	The wind farm Development Site at Moanmore Lower is approximately 14 km west of the pNHA. There are no linkages, ecological or hydrological, between the pNHA and the wind farm Site.
Clonderalaw Bay pNHA (site code: 0027)	Not stated, but an important estuarine system and supports large numbers of wetland birds.	The proposed Development Site is approximately 9 km west-northwest of the pNHA. There are no ecological links between the two areas. While the Site for proposed wind farm drains to the Shannon system, this is downstream of the pNHA and there is no realistic connectivity between the two locations.
St Senan's Lough pNHA (site code: 0001025)	Not stated but an important wetland with good fen system.	The proposed Development Site is approximately 5 km northwest of the pNHA. There are no linkages, ecological or hydrological, between the pNHA and the wind farm Site.
Scattery Island pNHA (site code 001911)	Not stated but includes a range of coastal habitats and notably a good example of a sedimentary lagoon. Supports a range of coastal bird species, as well as hen harrier. Otter occurs on the island.	The proposed Development Site is approximately 4.6 km north of the pNHA. There are no ecological linkages between the two areas. The pNHA provides suitable wintering and breeding habitat for hen harriers, which forage in area of site. While the Site for the proposed wind farm drains to the Shannon system there is no realistic prospect of contaminated run-off emanating from the Site and having effects on the Scattery Island pNHA, which is

Site	Reasons for designation (information correct as of 6 th March 2025)	Distance from proposed Moanmore Lower wind farm site and summary of connectivity
		located a distance of over 2 km from the Poulnasherry Bay inlet.
Tarbert Bay pNHA (site code: 001386)	Not stated but an estuarine system and important for wintering wetland birds.	The proposed Development Site is approximately 12.5 km northwest of the pNHA. There are no ecological linkages between the two areas. While the Site for proposed wind farm drains to the Shannon system, this is downstream of the pNHA and there is no realistic connectivity between the two locations.
Ballylongford Bay pNHA (site code: 001332)	Not stated but a large estuarine complex.	The proposed Development Site is approximately 9 km north of the pNHA. There are no ecological linkages between the two areas. While the Site for proposed wind farm drains to the Shannon system, this is downstream of the pNHA and there is no realistic connectivity between the two locations.
Beal Point pNHA (site code: 001335)	Not stated, but importance for sand dune and salt marsh habitats.	The proposed Development Site is approximately 11 km northeast of the pNHA. There are no ecological linkages between the two areas. While the Site for the proposed wind farm drains to the Shannon system, there is no realistic prospect of contaminated run-off emanating from the Site and having effects on the Beal Point pNHA, which is located an open water distance of approximately 8 km from the Poulnasherry Bay inlet.
Poulnasherry Bay pNHA (site code: 0065)	Not stated but an important estuarine system and supports important numbers of wintering wetland birds.	The proposed Development Site is within 1.22 km of Poulnasherry Bay and drains directly to the bay via the Moyasta River. There are potential ecological linkages between the two areas and confirmed hydrological linkages. As the Site for the proposed wind farm is close to Poulnasherry Bay via the Moyasta River, and drains directly to the bay, there exists a hydrological linkage with the pNHA.

Site	Reasons for designation (information correct as of 6 th March 2025)	Distance from proposed Moanmore Lower wind farm site and summary of connectivity
Tullagher Lough Bog pNHA (site code: 0070)	Not stated, but a complex of bog and wetland habitats, with some rare flora species. Also of importance for birds, including Greenland white-fronted geese.	The proposed Development Site is approximately 4 km southeast of the pNHA. There are no linkages, ecological or hydrological, between the pNHA and the wind farm Site.
Farrihy Lough pNHA (site code: 00200)	Not stated but a coastal lagoonal system.	The proposed Development Site is approximately 8 km southeast of the pNHA. There are no linkages, ecological or hydrological, between the pNHA and the wind farm Site.
White Strand/Carrowmore Marsh pNHA (site code: 001007)	Not stated but an important sand dune and coastal system.	The proposed Development Site is approximately 8 km south of the pNHA. There are no linkages, ecological or hydrological, between the pNHA and the wind farm Site or grid connection route. The section of the TDR along the L6132 crosses three watercourses, two upstream of the Doonbeg River (Tullagower river & Brisla East stream) and one on the Moyasta River. The Doonbeg River flows in a west to northwest direction for approximately 13 km before entering Doonbeg Bay and the pNHA. Hence, hydrological connectivity exists between the TDR component of the Project and the pNHA. It is concluded that hydrological connectivity exists between the Project area and the SAC via the TDR.
Carrowmore Point to Spanish Point and Islands pNHA (site code 001021)	Not stated but a large coastal site including rocky shore.	The proposed Development Site is approximately 11 km south of the pNHA. There are no linkages, ecological or hydrological, between the pNHA and the wind farm Site.
Illaunonearaun pNHA (site code 001014)	Not stated but an important site for barnacle geese and some breeding seabirds.	The proposed Development Site is approximately 14 km east of the pNHA. There are no linkages, ecological or hydrological, between the pNHA and the wind farm Site.

6.3.3 Habitats and Vegetation

The dominant habitat within the survey area is wet grassland (GS4), much of which has been semi-improved for grazing over time. In the western half of the survey area the main

habitat is cutover raised bog (PB4), which has had a long history of peat cutting though is generally well vegetated. Of particular note is the presence of a remnant area of uncut raised bog (PB1).

In the following sections, the vegetation composition of the habitats is described, with a list of the plant species occurring presented in **Appendix 6.1**. The habitats which occur at the locations for the wind farm infrastructure are listed in **Table 6.8**. Habitats which occur on the Site are mapped in **Figure 6.4** in Vol III. Habitat codes are after Fossitt (2000).

6.3.3.1 *Wet grassland (GS4) / semi-improved wet grassland (GS4/GA1)*

Wet grassland is the dominant habitat within the survey area. The main species in the vegetation is soft rush *Juncus effusus*, with frequent Yorkshire fog *Holcus lanatus*, creeping buttercup *Ranunculus repens*, sweet vernal-grass *Anthoxanthum odoratum*, meadow buttercup *Ranunculus acris*, cuckoo flower *Cardamine pratensis* and flag iris *Iris pseudacorus*. Within the survey area much of the habitat is grazed by cattle and this grazing often gives a semi-improved appearance to the sward (see **Plate 6.13**). There is a locally high cover of species such as perennial rye grass *Lolium perenne*, broadleaved dock *Rumex obtusifolius*, red clover *Trifolium pratense* and creeping thistle *Cirsium arvense*, which indicates a degree of agricultural improvement in places.

In the north of the survey area the wet grassland is much less improved and soft rush *Juncus effusus* has a much greater cover in the vegetation (see **Plate 6.14**).

The spoil storage area is also dominated with wet grassland, which varies from areas with dense rush cover to more open areas with patches of yellow iris (see **Plate 6.15**).



Plate 6.13. General view of grazed, semi-improved wet grassland, which dominates the eastern half of the survey area (May 2022).



Plate 6.14. View of wet grassland in the north of the survey area with a high cover of soft rush (*Juncus effusus*) (May 2022).



Plate 6.15. View of wet grassland in the proposed spoil storage area to east of local road. Yellow iris is frequent in parts (September 2023).

6.3.3.2 Wet grassland (*Molinia meadow*)

A small area of wet grassland which shows affinities to the EU Annex I habitat *Molinia* meadows [Code 6410] occurs in the south of the survey area (see **Figure 6.4 & Plate 6.16**). This vegetation has developed in an area of cutover bog where a residual peat soil occurs. The main species in the relatively species-rich vegetation are purple moor-grass *Molinia caerulea*, devil's-bit scabious *Succisa pratensis*, marsh bird's-foot trefoil *Lotus uliginosus* and sweet vernal grass *Anthoxanthum odoratum*, with tormentil *Potentilla erecta*, soft rush *Juncus effusus*, sharp-flowered rush *Juncus acutiflorus*, carnation sedge *Carex panicea* and ling heather *Calluna vulgaris* also locally frequent. Moss cover is mainly provided by *Pleurozium schreberi* and *Rhytidadelphus squarrosus*.



Plate 6.16. View of *Molinia* wet grassland in the south of the survey area (September 2023).

6.3.3.3 Improved grassland (GA1)

A small area of agriculturally improved grassland occurs in the north of the survey area. This vegetation occurs on a low ridge with well-drained mineral soils and the vegetation is dominated by Yorkshire fog *Holcus lanatus* and perennial rye-grass *Lolium perenne*.

6.3.3.4 Raised bog (PB1)

A small area (c. 1.8 ha) of uncut raised bog occurs in the west of the survey area. This remnant area of bog has a uniform surface vegetation (see **Plate 6.17**), which is dominated by ling heather *Calluna vulgaris* and common bog cotton *Eriophorum angustifolium* with frequent bog myrtle *Myrica gale* and hare's tail bog cotton *Eriophorum vaginatum*. Cross leaved heath *Erica tetralix*, carnation sedge *Carex panicea*, bog asphodel *Narthecium ossifragum* and deer grass *Trichophorum germanicum* are also common throughout. The bog surface is slightly quaking, having a *Sphagnum* cover of between 30 to 60% with *Sphagnum capillifolium* and *Sphagnum tenellum* the main species present. However, there are no wet pool areas with open water. The cut edges of the bog are now dominated by ling heather (see **Plate 6.18**).

Although there is a relatively good raised bog flora present, all of the surrounding areas have been subject to long-term cutting with associated drainage effects to the remaining high bog and thus the bog lacks a surface pattern with pools, hummocks and lawns. As

this is now essentially an isolated high bog remnant, the habitat would not be considered as an example of the priority Annex I habitat Active raised bog [7110].



Plate 6.17. View of the surface of the intact raised bog remnant area in the west of the survey area (May 2022).



Plate 6.18. View of the cut edge of intact raised bog remnant. Ling heather thrives along the drier edges (September 2023).

6.3.3.5 Cutover bog (PB4)

The western half of the survey area is dominated by cutover raised bog habitat (see **Plates 6.19 & 6.20**). The area has clearly been subject to extensive peat-cutting in the past however the intensity of cutting appears to have declined in recent years. Typically, the main plant species in the vegetation are ling heather *Calluna vulgaris*, many-flowered bog-cotton *Eriophorum angustifolium*, purple moor grass *Molinia caerulea*, carnation sedge *Carex panicea*, cross-leaved heath *Erica tetralix*, hare's tail bog-cotton *Eriophorum vaginatum* and bog myrtle *Myrica gale*. In the northwest of the survey area, where there is evidence of more recent turf cutting, bare peat was conspicuous and accounted for 10 to 20% cover in places.

The cover of Sphagnum is quite variable throughout, depending on local wetness and degree of disturbance, however a cover of 20 to 50% is typical. *Hypnum jutlandicum* and *Sphagnum capillifolium* are the main moss species occurring with *Sphagnum papillosum* locally frequent.



Plate 6.19. View of cutover bog surface located to the north of the uncut raised bog remnant area (seen at right hand edge of image) (May 2022).



Plate 6.20. View of cutover bog surface looking west towards the remnant high bog (left in image) (September 2023).

6.3.3.6 Drainage ditches (FW4)

A number of deep drainage ditches occur within the western half of the survey area and some of these have been deepened/cleaned recently. However, most have a fairly stagnant flow and support an aquatic or semi-aquatic vegetation. Frequent plant species growing in these ditches include starwort species (*Callitriche* spp.), bulbous rush *Juncus bulbosus*, bog pondweed *Potamogeton polygonifolius*, jointed rush *Juncus articulatus*, lesser spearwort *Ranunculus flammula*, floating sweet-grass *Glyceria fluitans*, common reed *Phragmites australis*, fool's watercress *Apium nodiflorum* and celery leaved buttercup *Ranunculus sceleratus*.

6.3.3.7 Coniferous plantation (WD4)

Conifer plantation is the dominant habitat within the proposed blade transfer area at Tullabrack East. The habitat occurs on peat (former raised bog). The main tree species is sitka spruce *Picea sitchensis*. The trees were planted in the late 1990s and are now well in the closed canopy stage. The ground layer is very species-poor being dominated by conifer needles along with occasional clumps of mosses such *Hypnum jutlandicum*, *Rhytidiadelphus loreus*, *Thuidium tamariscinum* and *Plagiothecium undulatum*. Vascular plant species have a very low cover, with purple moor-grass *Molinia caerulea* and broad

buckler fern *Dryopteris dilatata* the principal species and especially towards the margins of the conifer stands.

6.3.3.8 Scrub (WS1)

Small areas of scrub occur scattered throughout the survey area. The majority occur along the margins of drains where better drained peat soils occur. The main species are common gorse *Ulex europaeus* and eared willow *Salix aurita*. In the east of the survey area a small area of scrub occurs in association with a ringfort. The main species at this location are common gorse *Ulex europaeus* and briar *Rubus fruticosus* with occasional bushes of hawthorn *Crataegus monogyna*. The associated scrub ground layer includes bracken *Pteridium aquilinum*, Yorkshire fog *Holcus lanatus*, sweet vernal grass *Anthoxanthum odoratum*, bluebell *Hyacinthoides non-scripta* and pignut *Conopodium majus*.

6.3.3.9 Hedgerows (WL1)

Hedgerows are not a prominent feature of the wind farm site. Those present, such as along existing tracks and around the grassland fields, are typically of low stature (2-4 m) and without tree standards. The hedges are usually associated with grassy banks and ditches. Hawthorn and willow are the main species, with bramble frequent in the ground layer.

The conifer plantation at the proposed blade transfer area (Tullabrack East) is lined on the roadside by a hedge of approximately 6-7 m in height (see Plate 6.21). The hedge is dominated by willow, with dense bramble and some bracken in the ground layer. As the hedge adjoins the conifer plantation and is no longer managed as a field boundary, it has taken on a scrubby character.



Plate 6.21. View of hedgerow dominated by willow along local road at blade-set down area, Tullabrack East. Also visible above the willow line are the conifer trees which will be clear-felled (2024).

Table 6.8: Summary of the main habitats occurring at wind farm infrastructure locations.

Structure	Main habitats occurring within wind farm footprint
Turbine no. 1	Wet grassland (GS4)
Turbine no. 2	Cutover bog (PB4)
Turbine no. 3	Wet grassland (GS4) inc. Molinia meadow
Substation	Semi-improved wet grassland (GS4/GA1)
Construction compound	Semi-improved wet grassland (GS4/GA1)
Spoil storage area	Wet grassland (GS4) / Semi-Improved wet grassland (GS4/GA1)
Blade transfer area	Conifer plantation (WD4)

6.3.3.10 Grid Connection route corridor description

On leaving the Site for the proposed wind farm, the Grid Connection route follows the local road (L2034) northwards for approximately 500 m and then turns east at the first crossroads. It continues along this local road for approximately 1,800 m to the existing Tullabrack 110kV Substation.

The stretch of road from the wind farm site to the crossroads is edged on both sides by grassy margins, ditches and low hedgerows (WL1). The hedging is mostly from 2 to 4 m in height and mostly comprises hawthorn, blackthorn, willow and some ash, with occasional sycamore (see **Plate 6.22**). The stretch from the crossroads to Tullabrack substation is also lined with grassy verges and hedgerows. The hedgerows here are dominated by willow and hawthorn, often up to 5-6 m in height (see **Plate 6.23**), though stretches of very low hedging or banks without hedging also occur (see **Plate 6.24**).

There are two stands of commercial forest plantation (WD4) on the north side of the road just east of the entrance to the substation. Both are in closed canopy stage. Otherwise, the local roads skirt grassland fields, most of which can be classified as wet grassland.



Plate 6.22. View of local road running northwards after exiting from the wind farm site. Hedging along this section is low and mainly of hawthorn (September 2023).



Plate 6.23. View of local road running eastwards towards Tullabrack 110kV Substation. Much of this is lined by tall hedging dominated by willow (September 2023).



Plate 6.24. View of local road running eastwards towards Tullabrack 110kV Substation. This section is lined by scattered hedging and low banks often dominated by bracken and brambles – looking eastwards towards Moanmore Wind Farm (September 2023).

6.3.3.11 Turbine Delivery Route description

The Turbine Delivery Route will largely use Motorway or National routes, along which no works are proposed. Some works (permanent and temporary) will be necessary to accommodate the delivery of turbine components along the L6132 local road.

The L6132 road is typically bounded by grass verges and ditches/banks, with associated hedgerows and/or treelines. The hedgerows are generally low in height (mostly less than 4-5 m) and composed mainly of willow (*Salix* spp.), hawthorn and blackthorn (see **Plate 6.25**). In places, hedging is absent or intermittent, with banks dominated by bramble and bracken *Pteridium aquilinum* (see **Plate 6.26**). Tree standards are scarce and are mostly low to medium sized ash and sycamore. Treelines are a feature near residences, with ash and sycamore the principal species, as shown in **Plate 6.27**.

The hedging is usually associated with ditches, some of which are substantial (>2 m width) with deep water and supporting aquatic plants such as reed canary grass *Phalaris canariensis*, bulrush *Typha latifolia* and yellow iris *Iris pseudacorus*.

At the junction with the N68, there is an island surrounded by roads (part of which will be upgraded to support the delivery vehicles) - this is grassland with some low willow scrub and brambles (see **Plate 6.28**).

The stream crossings (no. 3) along the L6132 component of the TDR are described in detail in **Chapter 7** and **Chapter 9**. These watercourses, which have been mostly channelised in the past (see **Plate 6.29**), are minor examples of the habitat Depositing/lowland rivers (FW2).



Plate 6.25. View of typical hedging along the TDR L6132 local road (looking eastwards). Willow is a frequent species, with hawthorn and blackthorn also present (November 2023).



Plate 6.26. View of section of L6132 local road where hedging is largely absent - looking eastwards (November 2023).



Plate 6.27. View of treeline along L6132 local road (looking westwards). Species are mainly ash and sycamore (October 2022).



Plate 6.28. View of junction between N68 and local road showing grassy island with some scrub. Looking eastwards towards N68 (October 2022).



Plate 6.29. View of Moyasta River tributary stream (Gowerhass) along L6132 local road. This, as well as the other stream crossings along the L6132, are minor watercourses and are not suitable for supporting species such as otter (November 2023).

6.3.3.12 Invasive species

During the field surveys, a search for Invasive Alien Species (IAS) listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 – 2021 was conducted. The main regulations influencing Ireland's invasive species lists are:

- the Third Schedule list of the European Communities (Birds and Natural Habitats) Regulations 2011 [S.I.477/2011]
- the Invasive Alien Species of Union concern listed under the EU IAS Regulation [1143/2014]

No species listed on this schedule were recorded during the ecology surveys within the site for the proposed turbines, or along the route for the grid connection.

However, during the survey for freshwater pearl mussel undertaken by APEM in October 2023 (see **Chapter 7: Aquatic Ecology**) Japanese knotweed *Fallopia japonica* was recorded along the channel of the Brisla East Stream to the south side of the L6132. This was located several metres upstream of the road crossing.

6.3.3.13 Protected flora

No nationally rare or legally protected plant species listed in the 2022 Flora (Protection) Order were recorded from within the survey area during the baseline surveys.

The NPWS Flora Protection Order 2022 Map viewer was consulted on the 18/10/2024 and it revealed that there are no known previous records of legally protected plant species from within the survey area or closely adjoining areas. The nearest known site for such a species is to the north of Tullagher Lough, located approximately 5 kilometres to the north-west of the wind farm site, which has a recent (1987 to 1999) record for the legally protected species bog orchid (*Hammarbya paludosa*) (Conaghan, Roden and Fuller, 2006).

6.3.4 Mammals, Amphibians and Reptiles

Signs (both scats and prints) of red fox *Vulpes vulpes* were observed along existing tracks within the site. The Irish hare *Lepus hibernicus timidus* is fairly widespread throughout the site area, with observations from both the bog and wet grassland fields. Various widespread occurring small mammal species, including pygmy shrew *Sorex minutus* and field mouse *Apodemus sylvatica*, would be expected within the Site area.

Evidence of deer presence (prints) was recorded in several of the fields - based on the known distribution of deer in Ireland (Lysaght & Marnell 2016), these are likely to be fallow deer *Dama dama*.

No signs of badger *Meles meles* activity was recorded in the survey area. This is not surprising as peat bogs provide poor habitat for badger, which normally require well drained soils to excavate setts. In Ireland, setts are particularly associated with clay banks within hedgerows, native woodland and scrub (Smal 1991). Out of 565 setts in the National Badger Survey, only one was recorded in each of raised bog and blanket bog, and only six in lowland unimproved grassland.

There is no habitat to support pine marten *Martes martes* or red squirrel *Sciurus vulgaris* within the wind farm Site, though pine marten had been recorded (October 2022) in the vicinity of the conifer plantation proposed for the blade laydown area.

While otter *Lutra lutra* occurs on the Moyasta River (recorded approximately 4 km upstream of the site in May 2022), there was no evidence of otter presence during the baseline surveys undertaken in November 2023. However, it can be assumed that otter would at times traverse the entire stretch of river, as it is also known from along the shore of

Poulnasherry Bay and the Shannon estuary. It is noted that none of the three watercourses along the L6132 local road which would be crossed by the Turbine Delivery Route provide suitable habitat for otter due to their small size, *i.e.* little more than channels (see **Plate 6.29**). No signs of otter presence were recorded on the surveyed sections of these streams during the freshwater pearl mussel survey carried out by APEM in October 2023 (see **Chapter 7: Aquatic Ecology**).

The common frog *Rana temporaria* is widespread within the site, occurring within drains and also on wet bog. As permanent freshwater ponds are absent from the Site, the site generally does not provide suitable habitat for the smooth newt *Lissotriton vulgaris* (though the species can at times occur on wet peat bogs).

The common lizard *Zootoca vivipara* was recorded on cutover bog in June 2024 and is likely to have a sparse distribution throughout the bog habitats.

6.3.5 Bats

6.3.5.1 Desk review results: historical records

The wind farm site itself is not located within 10 km of any internationally or nationally designated site which include bats in their conservation interests.

The National Biodiversity Data Centre (NBDC) holds previous records of bat presence from within the 10 km square (Q95) in which the proposed site is located. These records are for brown long-eared bat *Plecotus auritus* and soprano pipistrelle *Pipistrellus pygmaeus*.

The overall bat suitability index value (3131.11) according to 'Model of Bat Landscapes for Ireland' (Lundy *et al.* 2011) suggests the landscape in which the proposed site is located is of moderate to high suitability for bats in general. Species specific scores are provided in **Appendix 6.2 (Table 3.1)**.

Available bat records were provided by Bat Conservation Ireland (BCI) from their database of roost locations and other bat records. The relevant search area consisted of a 30 km radius around the proposed wind farm site. Where roost locations occur in private dwellings the location shown refers to relevant 1km grid square. Roost records are summarised in **Appendix 6.2 (Table 3.2 & Figure 3.1)**.

Consideration was given to the location of the proposed site relative to the 'Core Sustainance Zones' (CSZ) of all known bat roosts proximal to the site. In the absence of information specific to Ireland, CSZ distances provided in Collins (2023) are considered to be best available information. CSZ distances for species known to occur in Ireland range from 1 km to 4 km although these distances are based on limited information in some instances (Collins, 2023). Roost records were considered within a search area extending to 4 km from proposed turbine locations, and no roost records were identified within this 4 km radius.

The most proximal roost was recorded at Moneypoint, Co. Clare (R0352), approx. 7 km south-east of the proposed site. Species recorded at this roost location include brown long-eared bat, soprano pipistrelle, Natterer's bat and lesser horseshoe bat. The proposed wind farm site is located outside of the CSZs for the species of this roost (Collins, 2023).

BCI Volunteer based surveys and records submitted by Ecological Consultants (Ad-hoc records) were provided and analysed for the presence of the Annex II (EU Habitats Directive) listed Lesser Horseshoe Bat. An Ad-hoc record of common pipistrelle, soprano pipistrelle and lesser horseshoe bat was recorded south of Kilrush town centre, Co. Clare in 2019.

A protected species data request was submitted to NPWS and species records for the relevant area (10 km grid squares which the proposed site overlaps; Q85, Q86, Q94 Q95, Q96, R04, R05, R06, R15, R16) were received on 2nd November 2023 - no records were held for the Annex II listed Lesser Horseshoe Bat within the search area.

6.3.5.2 Potential roost assessment

Surveys were carried out to identify and investigate potential bat roosting features at the following locations:

- Proposed wind farm site
- Proposed grid connection route to Tullabrack 110kV Substation
- Proximal to the points of interest along the proposed TDR

During these surveys, all trees and bridges which might be impacted by the proposed design and structures which may potentially host significant bat roosts were inspected visually. Trees, structures (incl. bridges), where present, were considered and described according to Collins (2023).

6.3.5.2.1 Potential roosts at proposed wind farm site

Features with potential to accommodate significant bat roosts extending to a minimum of 268 m from the 'redline' boundary, as it relates to turbines, were considered for this assessment. EPA data regarding known locations of caves and historic mining operations was examined in order to identify the presence of any known underground features which could support a significant bat roost.

No key features likely to support a significant roost were recorded within this search area.

The roosting potential of trees on the proposed wind farm site was considered and no vintage or 'over-mature' trees were present in the study area and generally any trees present were vigorous and healthy. No bat roosts were identified in any tree and no trees with roosting features considered to be above 'negligible' suitability to roosting bats were present within the proposed wind farm site.

The development will require clear-felling of 0.89 ha of commercial forestry in the Townland of Tullabrack East to facilitate the construction of the blade set down area. The forestry to be felled consists mostly of sitka spruce and the felling is expected to take up to one month. Coniferous plantations that lack specimen trees are considered less likely to provide potential roosting opportunities for bats (Marnell *et al.*, 2022). No evidence of roosting bats was found within the blade transfer area at which the felling will occur.

6.3.5.2.2 Potential roosts along Grid Connection Route

Visual survey and inspection of Potential Roost Features (PRFs) which may be directly or indirectly impacted by the proposed grid connection route to Tullabrack 110kV Substation and access works was carried out following guidance set out in Collins (2023). The locations and details of structures assessed are presented in **Appendix 6.2 (Table 3.3 & Figure 3.2)**.

No evidence of roosting bats, current or historic, was found along the grid connection route proposed to Tullabrack 110kV Substation. No trees with suitability for roosting were identified along the route. The general habitat was of agricultural grasslands and coniferous plantation.

6.3.5.2.3 Potential roosts along Turbine Delivery Route (TDR)

Although not included in the 'redline' boundary, the turbine delivery route is an essential component of the overall wind farm project, and the potential impact of associated facilitation works is therefore considered. Visual survey and inspection of Potential Roosting

Feature (PRFs) which may be directly or indirectly impacted by the proposed works was carried out.

The section of the turbine delivery route assessed was generally characterised by sparse distributions of short-length mature treelines and hedgerows and was otherwise generally open and exposed in nature. The relevant potential roosting features along the proposed TDR include trees and structures (see **Appendix 6.2: Table 3.6 & Figure 3.4**).

No evidence of roosting bats was recorded along the proposed TDR. Four structures and 12 trees with bat roosting potential were identified along the portion of the TDR where facilitation works are proposed. Ten of these trees displayed PRF-I suitability (*i.e.* suitable for individual bats), with the potential to support individual bats opportunistically or very small numbers of bats due to size (see **Appendix 6.2, Table 2.3**). Two trees of PRF-M (*i.e.* suitable for multiple bats and may therefore be used by a maternity colony) suitability were recorded, with the potential to support multiple roosting bats. However, neither of these trees are proposed for removal to facilitate the delivery of turbine components.

No potential for impacts on any of the structures surveyed are envisaged and no further surveys are deemed necessary. The zone of influence of the proposed works is limited, confined to the immediate works area and is temporary in nature. In the event that a bat roost was present in one of the structures along this route, no potential impacts are likely to arise during the facilitation works proposed for the TDR or the delivery of the turbines components themselves.

6.3.5.3 Bat activity surveys - passive survey

Ultrasonic detector surveys were carried out at the proposed wind farm site across three seasons in 2023 and 2024 to record bat activity in the area, from which information on species composition, relative abundance and landscape usage could be derived. The surveys were carried out from three monitoring locations based on the turbine layout available at the time of each deployment.

For the 2023 surveys, the passive detector for monitoring station 'Bat_01' was deployed on a fence line along a nearby watercourse, approximately 80m from the proposed T1 turbine location. For this reason, the level of activity recorded at this particular location was considerably higher for all species (except Leisler's Bat) than would likely have been the case at the proposed turbine location. The 2023 data in relation to T1 is therefore not

representative of the proposed turbine location and the discussion on bat activity at this WTG location is with reference to 2024 data only. For the avoidance of doubt, no work is proposed at the 2023 'Bat_01' monitoring location. 2024 survey data accurately characterises activity at each of the proposed turbine locations. NatureScot (2021) requires at least one seasonal survey and acknowledges the likelihood of layout changes during the survey period and therefore it is considered that this approach is fully in compliance with best practice guidance.

Overall, in 2023, a moderate level of activity was recorded at the site between the two monitoring stations, with a high level of species' diversity. A total of 8 bat species were recorded (possibly nine as Whiskered Bats and Brandt's Bats are indistinguishable through ultrasonic detection). Overall, activity was highest in summer with a nightly average of 71.3 registrations. Common Pipistrelle was the most abundantly recorded species for the spring and summer monitoring seasons, with the highest average registrations per night for this species recorded in summer (33.4). Average nightly registrations for Soprano Pipistrelle and Leisler's Bat were highest in the autumn monitoring period (24.9 and 19.3 respectively). When comparing monitoring stations (excluding 'Bat_01') across three seasons in 2023, activity was highest at monitoring station 'Bat_02' for the summer and autumn monitoring periods. Activity levels were similar at both 'Bat_02' and 'Bat_03' monitoring stations for the spring period, with an acutely higher number of registrations recorded at 'Bat_03'.

Monitoring locations in 2024 for all three turbines were considered more representative of the habitats within which the turbines will be located. The results of passive monitoring are presented in **Appendix 6.2: Table 3.7**. The total count of registrations recorded in 2024 was 5,735, with the highest level of activity recorded in spring ($n=3,210$), with a nightly average of 94.4, followed by the summer and autumn monitoring periods. Of the three monitoring stations activity was lowest at 'Bat_03', a similar finding to that of the 2023 monitoring surveys. Activity was highest at monitoring station 'Bat_01' in spring and summer (43.5% and 48.3% respectively), while activity was acutely higher at 'Bat_02' in the autumn monitoring period than that of 'Bat_01' for this season.

Four species comprised the majority of registrations across the site and across all survey seasons. These species include common pipistrelle (37.4%), Leisler's bat (27.5%), soprano pipistrelle (22.7%), and Natterer's bat (10.9%). These species are all considered common and widespread within an Irish context and are largely considered generalist foraging species, despite their general avoidance of peatland habitat (Roche et al., 2014; Lundy et al., 2011).

The remaining species' registrations combined accounted for 1.5% of the total registrations recorded during the 2024 monitoring survey: brown long-eared bat (0.66%) and Nathusius' pipistrelle (0.61%), Daubenton's bat (0.14%), Myotis sp. (0.05%) and whiskered bat (0.02%) and were only recorded in a subset of seasons.

Overall, a moderate level of activity was recorded at the wind farm site for the 2024 monitoring period and a moderate level of species diversity, with eight of the nine resident species recorded. The Annex II species lesser horseshoe bat was not recorded during any of the passive surveys. The Moanmore Lower wind farm site generally lacks bat roosting opportunities and primarily represents a foraging habitat.

6.3.5.4 Overall evaluation of importance of site for bats

From the baseline assessment, no evidence of bat roosting in either structures or trees present within and immediately adjoining the Development Site could be found. Suitable foraging habitat exists within the wind farm site and aerial insect activity was observed to be good. Low to moderate levels of bat activity were recorded overall, and the site is not considered remarkable in a local context in terms of its value to foraging bats. The Annex II (EU Habitats Directive) listed lesser horseshoe bat was not recorded.

Taking into account the results of surveys undertaken, the modified nature of the site resulting from turbary and agricultural management, general lack of roosting opportunities and considering its local context, the study site is considered to be of **Local Importance (Lower Value)** for bats.

Based on current information, a derogation license issued under Regulation 54 of the European Communities (Birds and Natural Habitats) Regulations 2011 is not required to facilitate the proposed works.

6.3.6 Birds

6.3.6.1 Desk review results

6.3.6.1.1 International sites

Sites designated as Special Protection Areas are described in **Section 6.3.2.1** above (see **Table 6.6**) and are referred to in detail in the accompanying AA Screening Report and NIS.

The desk-top review concluded that there are no sites designated as Wetlands of International Importance under the Ramsar Convention within 20 km of the proposed Development Site.

The Important Bird and Biodiversity Areas (IBAs) Programme, overseen by Birdlife International, aims to identify, conserve and protect those areas throughout the world considered to be of the greatest significance to bird populations⁵. The desk-top review concluded that there are three IBA sites within 20 km of the Site Redline Boundary, as follows:

- West Clare Uplands - approximately 13.2 km northeast of the Site,
- Shannon and Fergus Estuaries - approximately 2.2 km west of the Site,
- Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle – approximately 20 km southeast of the Site

The West Clare Uplands IBA and the Stack's to Mullaghareirk Mountains IBA are of importance for breeding hen harrier, while the Shannon and Fergus Estuaries is of importance for wetland bird species.

6.3.6.1.2 Irish Wetland Bird Survey sites

The Irish Wetland Bird Survey (I-WeBS) monitors wetland bird populations in Ireland. There are four I-WeBS sites within 20 km of the Development Site (see **Table 6.9**).

Table 6.9: I-WeBS sites within 20 km of the proposed wind farm site.

I-WeBS Site	Site code
Shannon & Fergus Estuary Aerial	0H462
Tullagher Lough	0H008
Mid-Clare Coast (Mal Bay - Doonbeg Bay)	0H902
Farrihy Lough	0H007

6.3.6.1.3 BirdWatch Ireland Bird Sensitivity Tool

The Bird Sensitivity Mapping Tool for wind energy development provides a measured spatial indication of where protected birds are likely to be sensitive to wind energy developments (McGuinness *et al.* 2015).

A review of this mapping tool determined that no bird sensitivity ratings, as above, have been assigned to the area within which the proposed wind farm is encompassed.

⁵<http://www.birdlife.org/worldwide/programmes/important-bird-and-biodiversity-areas-ibas>

6.3.6.1.4 NPWS Rare and Protected Species Database

An information request was sent to the NPWS requesting records from the Rare and Protected Species Database for the hectad Q95 encompassing the proposed wind farm site. No relevant records regarding protected bird species were provided by the NPWS (8th December 2022) for the hectad Q95. However, it was noted that “the absence of information in the NPWS dataset for an area, does not necessarily imply a low biodiversity value for that area”, and that “the NPWS species dataset is incomplete, particularly for birds”.

6.3.6.1.5 Bird Atlas Records

The proposed wind farm is within the 10 km² hectad Q95. Records for that hectad from the published breeding and wintering atlases are given in **Appendix 6.4**, including the results from the most recent national survey Balmer *et al.* (2013). *Bird Atlas 2007-11: The breeding and wintering birds of Britain & Ireland*.

6.3.6.1.6 Identification of target species

Target species are typically those species which are afforded a higher level of legislative protection, or which are considered to be more sensitive to potential impacts from wind farm developments by virtue of their behaviour (SNH 2017).

The results of the comprehensive desk-top study, in conjunction with a site reconnaissance survey prior to the commencement of any surveys, were used to identify target bird species which were considered likely to occur in the study area. These target species formed the main focus of the bird surveys undertaken.

In conjunction with the findings of the desk-top study, which includes review of results for the relevant hectad (Q95) from previous Bird Atlas projects (see **Appendix 6.4**), the target species list was drawn from:

- Annex I of the Birds Directive as amended
- Species protected under the Fourth Schedule of the Wildlife Acts 1976-2022 (buzzards, eagles, falcons, harriers, hawks, kites, osprey, owls)
- Red-listed birds of Conservation Concern (Gilbert *et al.* 2021)
- Special Conservation Interest (SCI) species of SPAs within a 20 km radius of the Site

To ensure other species which may potentially be sensitive to wind farms were not missed during surveys, all other species of gull, wader, duck, diver, goose, swan, cormorant and heron were included as secondary species. It is generally considered that passerine

species are not significantly impacted by wind farms (SNH, 2017); however, their presence was recorded to provide a complete picture of bird usage of the Site.

Table 6.10 lists the species which were identified as target species for the study area. The conservation status for each species is given (it is noted that all birds are protected by the Birds Directive and all wild birds in Ireland are legally protected under the Wildlife Acts as amended).

Table 6.10: Target species identified for proposed Moanmore Lower Wind Farm Study Area.

Target Species	Conservation Status	Target Species for Site Y/N
Barn Owl (<i>Tyto alba</i>)	BoCCI Red-listed	Y
Black-headed gull	BoCCI Amber-listed	Y
Buzzard (<i>Buteo buteo</i>)	BoCCI Green-listed	Y
Common gull (<i>Larus canus</i>)	BoCCI Amber-listed	Y
Cormorant (<i>Phalacrocorax carbo</i>)	BoCCI Amber-listed	Y
Curlew (<i>Numenius arquata</i>)	BoCCI Red-listed/SCI	Y
Golden Plover (<i>Pluvialis apricaria</i>)	Annex I EU Birds Directive/ BoCCI Red-listed/SCI	Y
Hen Harrier (<i>Circus cyaneus</i>)	Annex I EU Birds Directive/ BoCCI Amber-listed/SCI	Y
Herring gull (<i>Larus argentatus</i>)	BoCCI Amber-listed	Y
Kestrel (<i>Falco tinnunculus</i>)	BoCCI Red-listed	Y
Kingfisher (<i>Alcedo atthis</i>)	Annex I EU Birds Directive/ BoCCI Amber-listed	Y
Lapwing (<i>Vanellus vanellus</i>)	BoCCI Red-listed/SCI	Y
Lesser black-backed gull (<i>Larus fuscus</i>)	BoCCI Amber-listed	Y
Little egret (<i>Egretta garzetta</i>)	Annex I EU Birds Directive / BoCCI Green-listed	Y
Mallard (<i>Anas platyrhynchos</i>)	BoCCI Amber-listed	Y
Merlin (<i>Falco columbarius</i>)	Annex I EU Birds Directive/ BoCCI Amber-listed	Y
Peregrine Falcon (<i>Falco peregrinus</i>)	Annex I EU Birds Directive / BoCCI Green-listed	Y
Snipe (<i>Gallinago gallinago</i>)	BoCCI Red-listed/SCI	Y
Sparrowhawk (<i>Accipiter nisus</i>)	BoCCI Green-listed	Y

Target Species	Conservation Status	Target Species for Site Y/N
Whooper Swan (<i>Cygnus cygnus</i>)	Annex I EU Birds Directive/ BoCCI Amber-listed/SCI	Y
Woodcock (<i>Scolopax rusticola</i>)	BoCCI Red-listed	

6.3.6.2 Field survey results

6.3.6.2.1 Presentation of results

In the following sections, results from the various surveys which were carried out over the period from October 2020 to March 2024 are summarised. Full results are given in **Appendices 6.5 to 6.8**. There then follows an evaluation of the conservation importance of the site of the proposed wind farm for birds.

6.3.6.2.2 Flight activity surveys

Results from the vantage point surveys over the four year period are tabulated for each species in the various appendices (**Appendices 6.5 to 6.8**), with corresponding flight lines plotted.

The use of the term 'study area' in the following refers to the core area where the three turbines are located plus a 500 m buffer zone, as shown in **Plate 6.3**.

Little egret

Little egret was recorded on three dates during the vantage point surveys.

On 1st February 2023, one flew northwards over western part of study area.

On 10th November 2023, there were two flightlines recorded (one involving two birds).

On 5th December 2023, there were two flightlines involving the same individual.

Grey heron

Grey heron was recorded regularly during vantage point surveys in summer and winter flying through the study area. All records involved single birds.

Cormorant

Cormorant was recorded on two dates (involving three records) in winter 2022/23 only – 6th December and 1st February. All records were of flying birds.

Mallard

Mallard was recorded during the vantage point surveys on three dates in summer (1st June 2022, 7th April 2023 & 6th June 2023), and on two dates in winter (1st March 2023 & 2nd February 2024). All records involved one or two birds flying.

Hen harrier

Hen harrier was recorded within the study area during both the summer and winter vantage point watches. All birds were either hunting or flying through. Both male and female birds were recorded.

Summer records were as follows:

2021: single males on 6th April & 4th May.

2022: single males on 1st June & 7th July.

2023: series of 13 records on four dates – 3rd May, 6th June, 7th July, 5th September. All involving single birds other than two together on 3rd May.

Winter records were as follows:

2020/21: male on 3rd March.

2021/22: females on 2nd November & 10th January, male on 11th January.

2022/23: series of six records on two dates – 10th October & 6th December. All involving single birds.

2023/24: male on 5th December, female on 3rd January, male on 2nd February.

Sparrowhawk

Sparrowhawk was a scarce species in all vantage point surveys. All records involved single birds flying and/or hunting.

In summer 2021, single birds were recorded on 6th April, 6th May and 6th July.

In winter 2022/23, singles were recorded on 6th December and 1st March, while in winter 2023/24, singles were recorded on 3rd January (perched only) and 2nd February.

Buzzard

Buzzard flightlines were recorded on four occasions during the summer surveys and on seven occasions during the winter surveys.

In summer 2022, one was recorded on 7th July 2022. In summer 2023, one was recorded on 6th June and two records on 5th September.

In winter 2022/23, one was recorded on 1st November, while in winter 2023/24 there was a series of six records on three dates (4th October, 10th November & 5th December)

Merlin

Merlin was recorded on one date during the summer vantage point watches and on six dates during the winter surveys.

Summer record was as follows:

2023: one hunting over bog and wet grassland on 7th April.

Winter records were as follows:

2022/23: singles flying/hunting across site on 6th December, 5th January and 1st February.

2023/24: singles on 5th December (female), on 3rd January (male), and on 2nd February.

Peregrine

Peregrine was recorded on two dates during the vantage point surveys.

On 29th September 2022, a male bird flew into study area and perched on a post, later hunted and killed a jackdaw.

On 4th October 2023, one was recorded flying southwards over study area.

Kestrel

Kestrel was the most frequently recorded bird of prey species during the vantage point surveys, with records within and around the study area in both summer and winter (apart from summer 2022). All involved single birds, apart from two birds together on 5th September 2023. Records involved birds flying and/or hunting.

Summer records were as follows:

2021: singles on 6th April, 8th June and 1st September.

2023: series of seven records on four dates - 3rd May, 7th July, 4th August & 5th September.

Winter records were as follows:

2020/21: singles 13th October and 3rd November.

2021/22: one on 2nd November.

2022/23: series of 12 records on six dates - 10th October, 1st November, 6th December, 6th January, 1st February & 1st March.

2023/24: series of four records on three dates - 4th October, 10th November & 5th December.

Golden plover

There was one golden plover flightline within the study area as follows: one bird flew westwards through the site on 2nd February 2024.

Lapwing

Lapwing was recorded on one date within the survey area as follows: on 5th December 2023, a flock of five flew west across site at 09.05 hrs, and later (10.07 hrs) a flock of 32 flew northeast.

Snipe

Snipe were recorded on three dates during the vantage point surveys, as follows: 25 flying over bog and then landing on 10th October 2022, four on 5th September 2023 and one on 2nd February 2024.

It is noted that the vantage point survey method does not reliably sample snipe flight activity. SNH (2017) notes "*Snipe are very difficult to detect on standard VP watches and are unlikely to be meaningfully recorded.*"

Greenshank

There were two records of greenshank within the study area as follows: one bird flew eastwards through eastern sector on 5th December 2023 and five flew westwards on 3rd January 2024.

Whimbrel

There were three whimbrel flightlines within the study area in summer 2023 as follows: on 3rd May, a flock of 21 circled over site and a flock of five flew east three minutes later; on 5th September one flew eastwards over study area.

Curlew

There was one curlew flightline within the study area as follows: one bird flushed by a surveyor flew across site on 29th September 2022.

Black-headed gull

There were two black-headed gull flightlines during the vantage point surveys, as follows: one bird flew northeast over site on 6th December 2022 and five flew south on 10th November 2023.

Common gull

There were two common gull flightline during the vantage point surveys, both on same date, as follows: two separate single birds flew over site 6th December 2022.

Herring gull

Herring gull flightlines were recorded during the vantage point surveys in both summer and winter seasons.

In summer, most records were of between one and three birds, with higher numbers of ten and six birds on 31st May 2022 and 3rd August 2022 respectively.

In winter, the species was relatively scarce, with no record more than three birds.

Lesser black-backed gull

Lesser black-backed gull flightlines were recorded within the study area mostly during the summer surveys. All records were of between one and three birds flying over the site

While recorded in each of the winter surveys, all records were of single birds. The scarcity of the species in winter reflects the status of the species in Ireland as mainly a summer visitor.

Great black-backed gull

There were two flightlines during the vantage point watch surveys, as follows: one on 7th April 2023 and one on 10th November 2023.

6.3.6.2.3 Transect surveys

The transect surveys give an overview of the breeding and wintering species which are associated with the principal habitats within the Site. The routes taken are shown in **Plate 6.5**.

Breeding birds

Two transect surveys for breeding birds within the site were carried out on 17th May and on 4th July 2023 (full results in **Appendix 6.7**).

The cutover bog supported relatively few breeding birds, with meadow pipit (Red-listed) and skylark the most frequent. The various drains with reeds and other marginal vegetation supported sedge warbler and reed bunting.

A range of passerine species typical of scrub and hedgerow habitats were recorded, including song thrush, blackbird, robin, wren, willow warbler, stonechat, starling and chaffinch. Swallows were regularly observed feeding over the site.

Winter birds

Winter transect surveys were carried out in winters 2022/23 (3 dates) and 2023/24 (2 dates) (details in **Appendices 6.6 & 6.8**).

Meadow pipit was the principal species recorded within the cutover bog habitat though in relatively low numbers.

Passerine species recorded in the scrub and hedgerow habitats were mostly resident species, including woodpigeon, mistle thrush, song thrush, goldcrest, starling, chaffinch and goldfinch. The winter thrushes, redwing (Red-listed) and fieldfare were recorded in both winters.

A male hen harrier was observed hunting over bog on 7th December 2023, with a kestrel on 9th January 2023.

6.3.6.2.4 Hen Harrier Winter Roost Surveys

Hen harrier roost surveys were carried out in winters 2022/23 and 2023/24. Information from the Irish Hen Harrier Winter Roost Survey indicated that there are two established roosts within a distance of approximately 5 km of the site proposed for the Moanmore Lower Wind Farm. These are located at Tullagher Lough and Scatterry Island (see **Plate 6.6**).

In winter 2022/23, there were a total of 13 observations of hen harriers. Most of the records were of birds flying and/or hunting in the vicinity of Tullagher Lough, with three observations of birds going to roost. Most records were of single birds though three together were observed on 18th January 2023. Two birds were recorded at the Scatterry Island roost location on 16th March 2023.

In winter 2023/24, there were a total of eight observations of hen harriers from the Tullagher Lough area, with roosting confirmed on one date in March. All records were of single birds, with both male and female birds involved.

There was no evidence of any further winter roosts within the study area.

6.3.6.2.5 Hen harrier breeding survey

Hen harrier breeding surveys were carried out in summer 2023 (see **Plate 6.7**). One sighting was made of an immature male bird approximately 4 km northeast of the site on 25th May.

The bird hunted and then flew northwards over plantation. There was no breeding behaviour recorded through the season within a 5 km distance of the site.

6.3.6.2.6 Raptor breeding survey

Surveys for breeding raptors within a 2 km distance of the site were carried out in summer 2023. Three species were recorded, as follows:

Hen harrier: single adult males on 12th June and 9th July to north of site, with the latter bird within the 500 m study area. No evidence of breeding behaviour.

Kestrel: female bird observed perched on pole on 12th June, and two hunting over bog on 9th July. Both records within the study area. No evidence of breeding behaviour.

Buzzard: singles observed hovering / soaring on 26th May and 9th July. Both records within the 500 m study area. No evidence of breeding behaviour.

6.3.6.2.7 Wader breeding survey

Surveys for breeding waders were carried out in summer 2023 (see **Plate 6.8**). There were no observations of any wader species during the surveys.

6.3.6.2.8 Woodcock breeding survey

A survey for breeding woodcock was undertaken in 2023. No woodcock were recorded in the survey area (see **Plate 6.8**).

6.3.6.2.9 Woodcock winter survey

A survey for wintering woodcock were carried out on 9th November 2023. A single bird was observed in flight in the late-evening period over an area of cutover bog and forestry, approximately 1.7 km north of the Development Site.

6.3.6.2.10 Barn owl survey

Building within approximately a 1 km distance of the site for the proposed wind farm were examined on 18th April 2023 (see **Appendix 6.9** for full details). Evidence of barn owl presence was recorded within a large stone barn with a partially collapsed roof at Carnaun. Six barn owl pellets were found below beams in the barn, and extensive 'white-wash' was found, indicating a frequent roost for a barn owl. The pellets were estimated to be 2-4 months old. The barn had no suitable nesting cavities, though an adjoining derelict cottage had two chimneys, one of which looked suitable as a potential nest site. Access was not available for an internal inspection.

A follow-up evening/night visit was made on 13th June 2023. No fresh pellets or 'whitewash' was detected in the stone barn or in the area around the adjacent cottage. No barn owl activity or vocalisation was detected during the visit.

From the two surveys, it was concluded that the stone barn is used as a winter roost and that breeding by barn owl was not occurring within the site.

6.3.6.2.11 Hinterland surveys

Hinterland surveys were carried out in April and November 2021 (**Appendix 6.5**) and in October 2022 and February 2023 (**Appendix 6.8**).

The April 2021 survey recorded three raptor species (buzzard, sparrowhawk & kestrel), lesser black-backed gull at several locations and migrant whimbrel passing over (total of 62). Little grebe, mallard, moorhen and tufted duck were recorded at Tullabrack Lough.

The November 2021 survey also recorded buzzard and kestrel, along with a peregrine to the east of Kilrush. A flock of 130 lapwing was observed just south of Moyasta, c.500 m from Poulasherry Bay.

The 2022/23 winter surveys recorded a similar range of species, including buzzard, kestrel (5 records), and peregrine (1 at Poulasherry Bay shore in February). Also, a hen harrier was observed in the innermost part of Poulasherry Bay in October, while little egret was recorded at two separate locations in February. Mallard (2), wigeon (1) and tufted duck (1) were observed at Tullabrack Lough in February.

While a range of bird species were recorded during the hinterland surveys, including little egret, hen harrier, peregrine and kestrel, the surveys did not locate any unknown sites or habitats which were of high importance for breeding and/or wintering birds. It is noted that the various small lakes which occur in the hinterland, notably Tullagher Lough, Moanmore Lough, Tullabrack Lough and Gower Lough, are not of significant importance for supporting breeding or wintering wetland birds. [Tullabrack Lough was surveyed as part of the Winter Wildfowl Survey – see following section].

6.3.6.2.12 Winter wetland bird surveys

Full results from the winter wildfowl surveys are presented in **Appendix 6.5.7** and **Appendices 6.6 & 6.8**. There follows a summary of the results for each site.

Moyasta Creek

This estuarine creek (as surveyed in September and November 2021) supported a range of wintering wetland birds, including the following (peak count given): wigeon (90), teal (235), pintail (14), mallard (58), little egret (16), golden plover (10), lapwing (43), dunlin (14), snipe (70), redshank (210), greenshank (15) and curlew (74).

Moyasta Creek is an important site and an integral component of the Poulnasherry Bay and Shannon Estuary system.

Poulnasherry Bay

The bay is an important part of the Shannon Estuary system, a site of International Importance for wintering wetland bird species. As expected, significant numbers of wintering species were recorded during the surveys, including shallow bay species such as great northern diver, great crested grebe and red-breasted merganser.

Peak counts for the principal wildfowl and wader species (as surveyed in winters 2022/23 & 2023/24) were as follows: wigeon (240), teal (269), pintail (97), mallard (61), little egret (33), golden plover (420), lapwing (191), dunlin (1,075), snipe (27), redshank (225), greenshank (28) and curlew (208).

Shannon shore: Kilrush to Knock

The shoreline of the Shannon Estuary system, a site of International Importance for wintering wetland bird species, comprises intertidal mud and sand flats and areas of salt marsh. Significant numbers of wintering species were recorded during the surveys, with peak counts for the principal wildfowl and wader species (as surveyed in winters 2022/23 & 2023/24) as follows: wigeon (305), teal (100), little egret (47), lapwing (98), snipe (83), redshank (102), greenshank (5) and curlew (139).

Clonderlaw Bay

Clonderlaw Bay, a large estuarine inlet, was surveyed on one date, 7th February 2023. Large numbers of several species were recorded, including teal (320), mallard (50), little egret (16), lapwing (200), dunlin (2,578), snipe (30), redshank (70), and curlew (178). Also present were 16 whooper swans.

Moanmore Lough

This small lake supports low number of birds, with ten mallard the highest count.

Tullabrack Lough

This is a small lake system located approximately 4 km northeast of the site for the proposed wind farm, supported small numbers of waterfowl species, as follows:

Whooper swan – six on 03.11.21, seven on 03.02.23

Little egret – two on 03.11.21

Moorhen – five on 03.11.21

Teal – seven on 03.11.21; eight on 04.12.23

Wigeon – ten on 03.11.21, seven on 03.02.23; 12 on 02.01.24

Mallard – 14 on 03.11.21; 36 on 11.10.23

Tufted duck – 11 on 03.11.21

6.3.6.3 Evaluation of Status of Ornithological Receptors

The following species, which were recorded during the various surveys, as discussed, are species of European conservation importance (as listed on Annex I of the Birds Directive as amended) and/or are species of national conservation importance (Red- or Amber-listed after Gilbert *et al.* 2021). Sparrowhawk and buzzard (both Green-listed) are included in the evaluation, as all bird of prey species are potentially sensitive to wind farm development. A summary of the status of each species in the overall study area follows.

Table 6.11: Conservation status of target species recorded in baseline surveys within the overall study area for the proposed Moanmore Lower Wind Farm.

Species	Annex I	Red list	Amber list	Green list
Whooper swan	Y		Y	
Little Egret	Y			Y
Mallard			Y	
Cormorant			Y	
Hen Harrier	Y		Y	
Sparrowhawk				Y
Buzzard				Y
Kestrel		Y		
Merlin	Y		Y	
Peregrine	Y			Y
Golden Plover	Y	Y		
Lapwing		Y		
Snipe		Y		
Woodcock		Y		
Curlew		Y		
Black-headed Gull			Y	
Common Gull			Y	
Herring Gull			Y	
Lesser Black-backed Gull			Y	

Species	Annex I	Red list	Amber list	Green list
Barn Owl		Y		

Whooper swan – Annex I; Amber List

Whooper swan was not recorded during the flight activity surveys within the study area and there were no records from any of the other surveys carried out within the wind farm study area (i.e. 500 m distance from turbines). The habitats within the wind farm study area are not considered suitable for this species.

In the wider area, there were two records at Tullabrack Lough (6 on 03/11/21 & 7 on 03/02/23), a record of nine during a wetland survey along the Shannon shore (Kilrush to Knock) on 7th December 2022, and 16 at Clonderlaw Bay on 7th February 2023. The following incidental records of whooper swan were also recorded: four c.2 km north of site on 15/12/22, 13 at Farrihy Lough on 18/01/23, and 19 in a field c. 5 km northwest of site on 10/02/23.

Little egret – Annex I; Green List

Little egret was an occasional visitor within the study area, with records during flight activity surveys on three dates in winter (one involving two birds). In addition, one was recorded feeding in a drain in June 2021 and one flew through site in June 2023. Little egret is a widespread winter species within Poulmasherry Bay (up to 33 on one survey date) and along the Shannon estuary (up to 47 on one survey date) and has also been recorded at Tullabrack Lough.

The records from the study area are undoubtedly birds from the Shannon system. The various drains within the site provide limited feeding habitat for little egret.

Mallard – Amber List

There were occasional records of mallard within the study area during the flight activity surveys in both summer and winter.

The Winter Wetland Surveys recorded mallard at Poulmasherry Bay and along the Shannon shoreline, as well as at Tullagher Lough and Moanmore Lough – mallard is a regular winter visitor to these areas.

Mallard is likely to breed within the vegetated channels and ditches within the site.

Cormorant – Amber List

Cormorant was recorded flying over the site on three dates during the flight activity surveys, all in winter 2022/23.

The Winter Wetland Surveys recorded cormorant at Poulnasherry Bay and along the Shannon shoreline, where the species is a regular winter visitor.

Cormorant breeds along the Clare coastline and also within the Shannon estuary.

There is no suitable habitat for this species within the Site or the immediate surrounding areas. Birds recorded flying over are likely to be associated with the local wintering populations (as mentioned above).

Hen harrier – Annex 1; Amber List

Hen harrier was a fairly regular species within the study area and within the wider hinterland of the wind farm site during the various baseline surveys.

In the flight activity surveys there were 17 records (on 9 dates) in summer and 13 records (on 8 dates) in winter. Some of the records would involve sightings of the same individuals. Most records were of birds hunting and/or flying through the study area. All records were of single birds other than two together on 3rd May 2023. Most of the records were of adult male birds. In addition, there were two records of male birds from the breeding raptor survey in 2023 (one within the 500 m buffer zone), a record of a male in January 2023 during a transect survey, and an incidental record of a male on 6th May 2023 which flew from Poulnasherry Bay into the study area.

While hen harrier was recorded in summer, there was no evidence of breeding activity within a distance of at least 2 km from the wind farm site. In the 2023 breeding hen harrier survey, only one bird, an immature male, was recorded approximately 4 km from the site.

The nearest traditional breeding population to the Moanmore Lower area is the West Clare Uplands population (and IBA), which is located approximately 15 km to the northeast and comprises a large area of bog, conifer plantation and grassland habitats. In the 2015 National Hen Harrier Survey, Ruddock *et al.* (2016) gave a population estimate of 3-9 pairs for North & West Clare, while in the 2022 National Hen Harrier Survey, Ruddock *et al.* (2023) gave an estimate of 4-7 pairs. This population had peaked at 12-16 pairs in 2010. The 2022 survey, however, showed a new area colonised in west Clare away from the uplands – this was within 10 km square Q95, which is same 10 km square that the Moanmore Lower study area is located. This somewhat novel non-upland area supported four confirmed/possible breeding pairs in 2022 (none had been recorded in this square in the 2015 National Survey),

with such numbers still breeding up to 2024. While this location is at a distance of approximately 4.5 km from the Moanmore Lower wind farm site, it can be assumed that most of the birds recorded foraging within or flying through the study area are associated with these breeding pairs rather than the traditional upland population in west Clare as the majority of foraging by breeding birds, and especially females, is within a distance of 5 km of the nesting area.

There was no evidence of winter roosting within the study area, with the nearest documented roosts approximately 5 km from Moanmore Lower.

From the available information it is concluded that the study area provides suitable foraging habitat for hen harriers in both summer and winter. The birds recorded are expected to be associated with a recently established breeding site at approximately 4.5 km from the proposed Moanmore Lower site, while those observed in winter are also likely to be from this location as well as other traditional roost sites in west Clare.

Sparrowhawk – Green List

Sparrowhawk was a scarce species within the study area in both summer and winter.

In the flight activity surveys, birds were recorded only in summer 2021 (3 dates) and in winters 2022/23 (2 dates) and winter 2023/24 (2 dates). While the species was not recorded during the 2023 breeding raptor survey, sparrowhawk was observed in the April 2021 hinterland survey.

Sparrowhawk is a species largely of woodland habitats though forages along hedgerows and in scrub. Open bog, apart from marginal scrub areas, is generally not suitable habitat for sparrowhawk.

Buzzard – Green List

Buzzard was a relatively scarce species within the study area, with a scatter of records in both summer and winter.

In the flight activity surveys, birds were recorded in summer 2022 (1 date) and in summer 2023 (3 records though two of these on one date in September). In the winter surveys, there was one record in winter 2022/23 and a series of six records on three dates in 2023/24. While there were two records of buzzard during the 2023 raptor breeding survey, there was no evidence of breeding within at least a 2 km zone around the wind farm site. Buzzard was recorded several times in the hinterland surveys.

Buzzard is now a widespread species within Ireland and frequents open, mixed countryside including areas with peat bogs. While there appears to be no breeding territories within the study area, the wind farm site provides foraging habitat for the species.

Merlin – Annex I; Amber List

Merlin was recorded on site in winters 2022/23 (3 records) and 2023/24 (3 records). There was one early summer record, involving a bird hunting over the site on 7th April 2023.

While it is likely that the vantage point surveys would have detected a breeding territory in the immediate Site area, merlin is an elusive species that is difficult to monitor. As the habitats within the Site and its hinterland are potentially suitable for breeding merlin, there is some possibility that there is a breeding territory in the wider area of the site (up to 5 km).

Overall, however, the available baseline data indicate that merlin is a rare species, mainly in winter, within the Site and its environs. Birds recorded in March and early-April may be on passage to breeding grounds elsewhere.

Peregrine falcon – Annex I; Green List

Peregrine was recorded during the flight activity surveys on two dates only – on 29th September 2022 and on 4th October 2023. The bird on the latter date landed on a post within the site and was later observed killing a jackdaw. A peregrine was also recorded near the Poulhasserry Bay shore during a hinterland survey in February 2023.

Kestrel – Red List

Kestrel was the most frequently encountered bird of prey, both in summer and winter, with individuals regularly observed hunting and/or flying within the study area. The species was also recorded in the 2023 breeding raptor survey and in the hinterland surveys.

Apart from one record involving two birds (5th September 2023), all records were of single birds, with both male and female birds.

While the baseline surveys, including the barn owl survey which checked potential building breeding sites within a 1 km radius of site, showed with a degree of certainty that there are no breeding kestrel sites within the study area, the frequency of records would suggest breeding must occur within 1-2 kilometres of the site.

Overall, the site provides good hunting habitat for kestrel.

Golden plover – Annex I; Red List

This Red-listed and Annex I species was recorded during the flight activity surveys on a single date only (2nd January 2024), when a single bird flew westwards through the site.

The Winter Wetland Surveys recorded golden plover at Moyasta Creek and Poulnasherry Bay, where the species is a regular winter visitor.

The habitats within the study area are generally not suitable for supporting feeding and/or roosting golden plover.

From the baseline information, it is concluded that golden plover is a rare visitor to the study area in winter. Golden plover does not breed in County Clare.

Lapwing – Red List

Lapwing was recorded on one date (5th December 2023) during the flight activity surveys, when flocks of five and 32 birds flew across the study area. In addition, a flock of 12 was observed feeding in a field just outside the study area on 4th January 2021.

The Winter Wetland Surveys recorded lapwing at Moyasta Creek, Poulnasherry Bay, and along the Shannon shoreline – lapwing is a regular winter visitor to these areas.

The habitats within the study area are generally not suitable for supporting feeding and/or roosting lapwing.

From the baseline information, it is concluded that lapwing is a rare visitor to the study area in winter. Lapwing is a localised breeding species in County Clare.

Snipe – Red List

Snipe was recorded on three dates during the flight activity surveys. A record of a flock of 25 birds, which landed on bog within the site on 10th October 2022, may have involved migrant birds or newly arrived wintering birds.

The Winter Wetland Surveys recorded snipe at Poulnasherry Bay and along the Shannon shoreline, where the species is a regular winter visitor.

While the study area could potentially support breeding snipe, there was no evidence from any of the summer surveys of snipe breeding on the bog habitats within the study area.

From the baseline information, it is considered that site provides suitable habitat for wintering snipe as well as birds on passage.

Woodcock – Red List

Woodcock was recorded within the study area on one date in winter (9th November 2023), approximately 1.7 km north of site. Woodcock is a fairly widespread species throughout Ireland in winter. The birds roost in cover within woodland during day and fly out to pastures to feed at night.

No evidence of woodcock was found during a breeding survey in 2023. Woodcock is a scarce breeding species in western Ireland (Balmer *et al.* 2013). The species prefers deciduous or mixed woodland with a good understorey of shrubs and a dense ground cover for concealment.

Taking into account the difficulty of surveying for a species that is largely crepuscular, it is likely that woodcock is a winter visitor to the wider study area in small numbers. However, breeding within the study area and its surroundings is unlikely.

Curlew – Red List

Curlew was recorded on only one date during the flight activity surveys, when a single bird was flushed and flew across the site on 29th September 2022.

The Winter Wetland Surveys recorded curlew at Poulnasherry Bay and along the Shannon shoreline, where the species is a regular winter visitor.

While the study area could potentially support breeding curlew, there was no evidence from any of the baseline surveys of curlew breeding within the study area.

From the baseline information, it is considered that curlew is a rare visitor to the study area.

Black-headed gull – Amber List

Black-headed gull was recorded flying over the study area on two dates in winter (December 2022 & November 2023).

The Winter Wetland Surveys recorded black-headed gull at Moyasta Creek, Poulnasherry Bay, and along the Shannon shoreline, as well as at Tullabrack Lough and Moanmore Lough. The species is a regular autumn and winter visitor to these areas.

The habitats within the study area are generally not suitable for supporting feeding and/or roosting black-headed gull.

From the baseline information, it is concluded that black-headed gull is a rare visitor to the area of the Site in winter. Birds recorded flying over are likely to be associated with the local wintering populations (as mentioned above).

Common gull – Amber List

Common gull was recorded over the study area on one date only, 6th December 2022, when two single birds flew over.

The Winter Wetland Surveys recorded common gull at Moyasta Creek, Poulmasherry Bay, and along the Shannon shoreline. The species is a regular winter visitor to these areas.

The habitats within the study area are generally not suitable for supporting feeding and/or roosting common gulls.

From the baseline information, it is concluded that common gull is a rare visitor to the study area in winter. Birds recorded flying over are likely to be associated with the local wintering populations (as mentioned above).

Lesser black-backed gull – Amber List

Lesser black-backed gull was recorded flying over the study area during the flight activity surveys mainly in summer though with records (all single birds) also in each of the winter surveys. All the records were of birds flying over the site. The species was also recorded over the site during a winter transect survey.

The Winter Wetland Surveys recorded lesser black-backed gull at Poulmasherry Bay, and along the Shannon shoreline, as well as at Tullabrack Lough and Moanmore Lough. The species is a regular autumn and winter visitor to these areas.

While the site does not provide suitable habitat for lesser black-backed gull, the species may be attracted to nearby fields where silage had been cut.

From the baseline information, it is considered that lesser black-backed gull is a regular visitor in small numbers to the study area during summer/autumn and to a lesser extent in winter. The birds observed in the Moanmore Lower wind farm study area in summer are expected to be from breeding colonies in coastal areas of Co. Clare, such as Mutton and Mattle islands near Quilty.

Herring gull – Amber List

Herring gull was recorded flying over the study area during the flight activity surveys in both summer and, to a lesser extent, winter. Most records were of between one and three birds, with a peak of ten in May 2022.

The Winter Wetland Surveys recorded herring gull at Poulmasherry Bay, and along the Shannon shoreline, as well as at Tullabrack Lough. The species is a regular winter visitor to these areas.

While the site does not provide suitable habitat for herring gull, the species may be attracted to nearby fields where silage had been cut.

From the baseline information, it is considered that herring gull is a regular visitor in small numbers to the study area during summer and winter. As with lesser black-backed gull, the birds recorded during summer in the Moanmore Lower area are expected to be from coastal breeding colonies in Co. Clare.

Barn owl – Red List

The barn owl building survey located what is considered a winter roost within a ruined stone barn just within the study area. While an associated derelict cottage was considered to have potential for nesting, no signs of breeding were recorded.

An incidental observation of a barn owl was made in the late evening of 26th January 2023 at Eirragh South, approximately 2 km north of the wind farm site.

It is considered likely that barn owl breeds in the local area.

Passerine species within study area

While passerine species are not included as target species, the site supports a range of species of conservation importance. Of particular note is meadow pipit (Red-listed) and skylark (Amber-listed), both of which breed widely in the bog habitats within the site. The following were recorded during the baseline surveys within the study area:

Red list species

Meadow pipit – widespread breeding and wintering

Swift – occasional over site in summer

Redwing – regular in winter, with numbers over 100 on some dates

Grey wagtail – recorded occasionally in winter, likely to breed along Moyasta River

Amber list species

Skylark – breeds widely in study area, rare in winter

Sand martin – scarce in summer

Swallow – regular in study area during summer, breeds locally

Goldcrest – scarce local resident

Willow warbler – summer visitor, breeds in scrub and hedges

Starling – resident and winter visitor

Linnet – local resident and winter visitor

6.3.7 Marsh Fritillary

The desktop study indicated that there is a total of 34 NBDC records of marsh fritillary within a 5 km radius of the Site. These are distributed within three 10 km² Hectads (Q95, R05 & Q96).

An intensive and focused larval web survey was carried out on 27th September 2023 by experienced ecologists in marsh fritillary surveying. No larval webs were discovered on site. Habitat suitability assessments were undertaken during larval web searches within areas of potentially suitable habitat for this butterfly species. The methodology followed NBDC Best Practice Guidance. During the site visits at Moanmore Wind Farm, one area (Block A) was assessed for potential suitable habitat for marsh fritillary (see **Plate 6.12**). The results outline that Block A contains 'suitable' habitat for marsh fritillary. The Marsh Fritillary habitat within Block A was mapped (using GPS) (details in **Appendix 6.3**). The results of the habitat condition assessments are outlined in **Table 6.12**.

Block A covers an area of approximately 1.97 ha of Molinia meadow habitat. This area has been assessed as '*Suitable (Over-grazed) Habitat*' for Marsh Fritillary. The overall habitat has a relatively species-rich sward ranging in average height of 25cm tall. There was extensive evidence of heavy grazing across the entire Block.

The devil's-bit scabious cover was dense in many places (>10 plants per m²), with the distribution widespread and reasonably consistent across the survey area. Where devil's-bit scabious occurred, the sward height was mostly 12 cm. However, there were only a few small pockets of '*Good Habitat Condition*' for marsh fritillary throughout the site, and these were located primarily in the scrub margins.

Table 6.12 Marsh fritillary habitat condition assessments results.

AREA	GRID REFERENCE	HABITAT CONDITION ASSESSMENT
Block A	Q 97890 57708	Suitable (Over-grazed) Habitat

6.3.8 Summary of Ecological Receptors and Conservation Value of Site

6.3.8.1 Habitats, vegetation and flora

The survey area at the Site for the proposed wind farm is dominated by wet grassland/semi-improved grassland habitat. This habitat is common throughout County Clare and the island

of Ireland and is generally of low botanical interest - rated as Negligible to Local Importance (lower value).

The presence of a small area (one field of c. 1.3 hectares) of *Molinia*-meadow type vegetation within the survey area is of interest as *Molinia* meadow is an EU Annex I listed habitat (though not listed with priority status⁶). At this site the *Molinia*-meadow type vegetation has developed in an area of cutover bog and it is likely that the habitat has a more widespread distribution within the cutover bog areas of south-west Clare. As the sward has been degraded in parts by recent heavy grazing, it is rated as of Local Importance (higher value).

A fairly extensive area of cutover raised bog and an associated remnant of uncut raised bog occurs in the western half of the survey area. This cutover area contains a typical cutover raised bog flora with a moderate cover of *Sphagnum* moss, especially in areas which have not been disturbed for some time. Although the small remnant area of intact raised bog has been affected by peripheral drainage/peat cutting over a long period of time and is not considered to be active, it is still of particular ecological interest as there are few other areas of uncut raised bog habitat remaining in this part of Co. Clare. As noted earlier, the bog type is former raised bog of the 'Western' category. In a detail evaluation of raised bogs in Ireland, Cross (1990) refers to Co. Clare and writes "*Raised bogs occurred in two areas; small bogs in the undulating lowlands east of Tulla and an extensive tract near Kilrush at the mouth of the Shannon (Monmore Bog). All bogs have been largely cut away leaving a few very small remnants behind.*" Taking the entire bog resource (cutover and intact) at this site as an ecological unit, a ranking of County Importance is appropriate.

The section of the Moyasta River in the vicinity of the Site has been dredged in the past and is classified as having "Poor-Moderate" ecological status quality under the current cycle of the Water Framework Directive as amended. As noted in the baseline fisheries report (**Appendix 7.3**), whilst the Moyasta River had been locally straightened and deepened, thus reducing its overall fisheries value, some instream recovery had occurred locally and several areas provided good quality salmonid nursery, holding and, to a more limited extent, spawning habitat. The Moyasta also supported a low density of anadromous sea trout, lamprey (*Lampetra* sp.) and the ubiquitous three-spined stickleback. The lower (tidal reaches) supported Red-listed European eel as well as common transitional species such as sand goby and flounder. The aquatic survey rated the streams crossed by the TDR as being of low ecological value. From the perspective of terrestrial ecology the main channel

⁶ NPWS (2013) The status of EU Protected Habitat and Species in Ireland

of the Moyasta River provides a useful riparian corridor for wildlife and is rated as Local Importance (higher value).

6.3.8.2 Terrestrial mammals, amphibians and reptiles

The Site supports a relatively low diversity of mammalian species, which is typical of bog habitats. The Irish hare and all deer species are protected under the Wildlife Acts. While not recorded breeding along the river, the likely presence at times of otter along the Moyasta River is of note as otter is listed on Annex II of the EU Habitats Directive as amended.

All mammal species recorded on Site, or expected to occur, are listed (as relevant) as 'Least Concern' on the Irish Red List (Marnell *et al.* 2019).

The common frog and the common lizard are protected under the Wildlife Acts, though both are listed as 'Least Concern' on the Irish Red List (King *et al.* 2011). The common frog is listed on Annex V of the EU Habitats Directive.

6.3.8.3 Bats

The bat assessment describes the study area in terms of roosting and foraging suitability for bats. A comprehensive and appropriate survey effort was employed, and no evidence of bat roosting in either structures or trees present within or immediately adjoining the proposed site could be found. Low productivity foraging habitat and suitable commuting habitat exists within the proposed wind farm site. No roosting was identified along the grid connection route or turbine delivery route (including the blade transfer area).

Taking into account the results of surveys described in this report, the nature and context of the site, the habitats present at the proposed site and their connectivity to the local environs, overall the study site is considered to be of Local Importance (Lower Value) for bats.

All bats recorded are classified as 'Least Concern' on the Irish Red List (2019) and protected under the EU Habitats Directive as amended Annex IV and the Wildlife Acts 1976-2022 as amended. Lesser horseshoe, which is listed as 'Annex II' under the EU Habitats Directive as amended, was not recorded during the baseline surveys.

6.3.8.4 Birds

The habitats within the Site provide suitable foraging habitat for hen harrier (breeding and winter roosting sites within 5 km of Site) and merlin (mainly a winter visitor), both species

listed on Annex I of EU Birds Directive as amended. Kestrel (Red-listed) occurs regularly in the area and hunts within the Site – kestrel is expected to breed within a 1-2 km distance of Site. Peregrine was recorded though is rare within the Site, while sparrowhawk and buzzard use the Site for hunting though both species are relatively scarce.

Snipe occurs within the site in autumn/winter but was not recorded breeding. Snipe is Red-listed on account of a significant decline in the breeding population. The Red-listed barn owl was recorded roosting during winter within a ruined stone barn in the study area. A further Red-listed species, meadow pipit, breeds widely in the bog habitats.

On the basis of providing foraging habitat for several bird species of high conservation importance, the Site is rated as of **Local Importance (higher value)** for birds.

6.3.8.5 *Marsh fritillary*

A desktop study indicated that marsh fritillary has a fairly wide distribution within a 5 km radius of the site. While no larval webs were discovered on site, habitat suitability assessments classified one area of the site as having potential suitable habitat for marsh fritillary.

6.4 ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

6.4.1 The 'Do-Nothing' Impact

Without the proposed wind farm development proceeding, it is expected that the present main land use on Site, namely grazing and to some extent peat cutting, will continue. An increase in grazing could cause further deterioration in the quality of the Molinia grassland, which has potential to support marsh fritillary. An increase in the intensity of peat cutting would have further detrimental effects on the raised bog remnant. Any planting of commercial forestry would have adverse effects on the ecology of the site.

Chapter 9, Section 9.4.3 notes that Met Éireann's Translate Project provides projections for a range of future climate change scenarios, as Ireland's future climate will depend on global greenhouse gas emissions reductions. The severity of any future climate change will depend on the degree of future warming. In relation to precipitation chances, the models show that summer rainfall may decrease by approximately 9% and winter rainfall could increase by up to 24%. As the hydrology of the intact bog on site is already disturbed from drainage and marginal cutting, such changes in rainfall are unlikely to have significant effects on the bog vegetation.

Overall, the ecology of the Site would be expected to remain fairly similar as at present though some changes would be expected if the land use activities were to change (as mentioned above).

6.4.2 Potential Impacts on European Conservation Sites

The AA Screening Report that accompanies this planning application has shown objectively that for six of the eight European sites identified within the zone of influence, there are no realistic Source-Pathway-Receptor linkages and hence there is no potential for effects on qualifying interests or Special Conservation Interests as a result of the proposed Development during the construction, operational and/or decommissioning phases of the Project. These sites are:

- Tullagher Lough and Bog SAC (code 002165)
- Carrowmore Dunes SAC (code 002250)
- Carrowmore Point to Spanish Point and Islands SAC (code 001021)
- Kilkee Reefs SAC (code 002264)
- Mid-Clare Coast SPA (code 004182)
- Illaunonearaun SPA (code 004

However, in the absence of mitigation, likely or possible significant effects could not be excluded during the construction, operational and/or decommissioning stages of the proposed Project on the following two sites:

- Lower River Shannon SAC (code 002165)
- River Shannon and River Fergus Estuaries SPA (code 004077)

Impacts of potential concern may arise as a result of contaminants originating within the Project area, and especially during the construction phase, reaching the relevant designated site and causing harmful effects on the qualifying interests and/or the Special Conservation Interests of the designated site. The significance of any effect would be dependent on the magnitude and duration of a pollution event. Mitigation is therefore required to eliminate or at the least to reduce the risk to a non-significant level. k.

Full details on the potential for adverse effects on these two European sites, and the required mitigation, are given in the accompanying NIS.

6.4.3 Potential Impacts on National Conservation Sites

6.4.3.1 Natural Heritage Areas

As noted, a single Natural Heritage Area (NHA) occurs within the 15 km radius of the Site (see **Figure 6.3** and **Table 6.7**), namely Cragnashingaun Bogs NHA. This is approximately 14 km to the northeast of the Site for the proposed Development and there are no ecological corridors or hydrological linkages with the Site.

It is concluded that the proposed Development does not have the potential to impact on the interests of the Cragnashingun Bog NHA.

6.4.3.2 Proposed Natural Heritage Areas

A total of 13 proposed Natural Heritage Areas (pNHAs) occur within a 15 km radius of the Site (see **Figure 6.3** in Vol III and **Table 6.7**).

The Poulnasherry Bay pNHA, which receives drainage from the Site via the Moyasta River, is the site in closest proximity (1.22 km straight line distance) to the location for the proposed wind farm Development. While the qualifying interests for this site are not stated, it is presumed that it is of ecological importance as an example of a shallow bay/estuarine system and in supporting important populations of wintering wetland birds. In the absence of mitigation, impacts of potential concern may arise as a result of contaminants originating within the Site of the Development reaching the bay via the Moyasta River and causing potential harmful effects on the ecology of the bay. Of particular concern would be the effect of particles on infaunal species and particularly filter feeding invertebrates. Feeding and roosting bird species could be adversely affected by surface deposits, including hydrocarbons. The significance of any effect would be dependent on the magnitude and duration of a pollution event. Mitigation is therefore required to minimise this risk. The issue of potential effects on the interests of Poulnasherry Bay pNHA, which is an integral part of the Lower River Shannon SAC, is assessed in the NIS.

While there is hydrological linkage between two stream crossing points along the L6132 section of the TDR route and the White Strand/Carrowmore Marsh pNHA, via the Doonbeg River, there is a stream distance of approximately 13 km between the two locations. And as there will be no instream works or deep excavation works at the two crossing points, there is no risk of contaminants reaching the pNHA as a result of the Project. It is concluded that there is no potential for impacts on the interests of the pNHA.

As the Scatterry Island pNHA provides suitable habitat for hen harrier, there exists a linkage with the site for the proposed wind farm as hen harriers forage over the wind farm site in both

summer and winter. This is discussed in detail in the ornithological section of this report (**Section 6.4.7.3**).

There are five pNHA sites (Clonderalaw Bay, Scattery Island, Tarbert Bay, Ballylongford Bay, Beal Point) located within or along the Shannon estuary system, which could theoretically (in absence of mitigation) receive water with contaminants emanating from the Development Site. It is considered, however, that there is no realistic potential for the interests of these sites to be affected in any significant way as any contaminants entering the drainage network at the proposed Development Site and subsequently the Shannon system would be completely attenuated by the dilution, dispersal and settlement that would occur within the Shannon estuarine system. Additionally, the CEMP presents a series of mitigation measures and a SWMP that when implemented will limit or prevent potential effects should contaminants enter local watercourses.

For the remaining listed pNHA sites, ecological or hydrological connectivity with the Site for the proposed Development has not been identified.

6.4.4 Impacts on Habitats, Vegetation and Flora

The construction of the proposed Development will result in the following impacts on terrestrial habitats and flora:

- permanent loss of habitat
- temporary loss of habitat
- disturbance to habitats
- changes to existing habitats

In addition, works both permanent and temporary as described in **Section 6.1.2.2** will be required along part of the Turbine Delivery Route to facilitate large transport vehicles.

The breakdown of habitats that will be lost permanently and temporarily to the Project are listed in **Table 6.13**.

Table 6.13: Habitat loss for the proposed project (before mitigation / enhancement)

Infrastructure	Habitat Type	Permanent Area of Loss (Ha)	Temporary Area of Loss (Ha)
T1 hardstand & foundation	Wet-Grassland (GS4)	0.7285	
T3 hardstand & foundation			

Infrastructure	Habitat Type	Permanent Area of Loss (Ha)	Temporary Area of Loss (Ha)
Access Track to T1	Wet-Grassland (GS4)	0.123	
Access Track to T3			
Flood Compensation Areas	Wet-Grassland (GS4)		0.343
Spoil Storage Area			
T2 hardstand & foundation	Cutover Bog (PB4)	0.5995	
Access Track between T2 and T3			
T3 hardstand & foundation	Cutover Bog (PB4)	0.078	
Substation	Semi-Improved Wet Grassland (GS4/GA1)	0.176	
Access Track			
Contractors Compound	Semi-Improved Wet Grassland (GS4/GA1)		0.131
Spoil Storage Area			
Access Track to T1	Improved grassland (GA1)	0.084	
Flood Compensation Areas	Improved grassland (GA1)		0.2525
T2 hardstand & foundation	Molinia meadow (GS4)/ Cutover Bog (PB4)	0.0185	
Blade Transfer Area	Conifer Plantation (WD4)	0.845	
Access track to T3	Hedgerow	0.002	
Blade transfer area	Hedgerow (former hedgerow, now a willow strip)	0.007	
Site entrance	Hedgerow		0.025
Total		3.92	3.41

6.4.4.1 Permanent loss of habitat

The permanent loss of habitat to facilitate the construction of the wind farm project is estimated at 3.9 ha. This will result from the following:

- Turbines foundations and hardstand areas
- Foundation for substation
- New access tracks

The majority of the affected habitat is wet grassland (GS4), which is semi-improved in parts (depending on recent management) and classified as wet grassland/improved grassland (GS4/GA1) (see **Figure 6.4**). This habitat type is widespread in the local area, and in Ireland in general, and of low ecological importance. The loss of wet grassland/improved grassland is rated as Not Significant.

Part of the wet grassland on former cutover bog has developed as Molinia meadow (see **Figure 6.4**), an Annex I listed habitat (though not with priority status). While the quality of the sward is somewhat degraded from grazing, it is still of local importance. Turbine T3 is located on the western margin of this field – here the Molinia meadow is poor due to effects from a deep drainage ditch along the field boundary. Soft rush and bramble are dominant in parts. The area required for the construction of T3 is approximately 200 m². The significance of the effect by the permanent loss of a small area of degraded Molinia meadow is rated as a Slight Negative Effect. Mitigation for loss of Molinia meadow will be provided through a Biodiversity Enhancement and Management Plan (BEMP) (see **Appendix 6.11**).

The construction of Turbine T2, including the hard stand and access road, will result in the permanent loss of an estimated 0.8 ha of cutover bog. The cutover bog at this site, which is now well re-vegetated, and occurs in association with a remnant area of uncut raised bog (which the proposed development has avoided entirely), is considered as part of an ecological unit of County importance. The permanent loss of 0.8 ha of cutover bog is rated as a Significant Adverse effect of Permanent duration. Mitigation for loss of cutover bog will be provided through a Biodiversity Enhancement and Management Plan (BEMP) (see **Appendix 6.11**).

As noted, 0.845 ha of conifer plantation at Tullabrack East will be clear-felled to facilitate a blade set-down area. This is presently closed canopy forest. As conifer plantation is a non-native habitat that is not classed as a key ecological receptor, the permanent loss of this habitat is rated as Not Significant (and see **Section 6.4.4.4**).

As hedgerows are not a prominent feature of the wind farm site, the loss of this habitat is low. The main permanent losses occur where the new access track leading to turbine T3 breaches a hedge along the existing farm track (c.20m) and also at the blade set-down area where a strip of approximately 70 m of former hedge (now a scrubby willow strip) along the northern margin of the plantation (see **Plate 6.21**) will be removed to allow access from the local road.

It is noted that the main track upgrade from the site entrance leading to the T3 area has hedging only along the southern side and the upgrade works will leave this hedgerow in situ.

Hedge removal is required at turbine T1 to provide a bat buffer around the turbine (see **Section 6.5.5.1**). This amounts to removal of 175 m of low hedging dominated by gorse.

The total loss of hedging amounts to 265 m, including the 175 m bar buffer. Mitigation will be provided to offset the loss of hedgerows on site (see **Section 6.5.2**).

6.4.4.2 *Temporary loss of habitat*

There will be temporary loss of habitat to facilitate the construction of the Project, for the following areas:

Spoil deposition area

Excess excavated peat and soil will be deposited in the designated spoil storage area to the east of the site entrance and local road (see **Chapter 2: Section 2.5.17** and **Appendix 2.1: CEMP**). This area is presently wet grassland/semi-improved wet grassland (see **Plate 6.15**). The area will be used to store spoil to a maximum height of 2m and will cover an area of 22,464m² which equates to 44,928m³ of capacity for spoil storage. The peat and soil/spoil will be stored separately. The cells will be topped with previously removed and stored peat (acrotelm layer as feasible) to promote regrowth of vegetation including bog plant species. From experience of sites elsewhere, rushes are likely to become dominant in a short space of time (1-2 growing seasons) and wet grassland will be re-established with elements of bog vegetation (approx. 3-5 growing seasons).

The impact by the temporary loss of wet grassland is Not Significant and on reinstatement the effect will be Neutral or even Slightly Positive in the medium- to long-term due to the likely establishment of some bog plants from the imported acrotelm peat.

Construction compound

The temporary construction compound will be located at the site entrance and will measure 1,165 m². This is presently wet grassland of low interest. After the works are complete, the compound will be removed and surface re-levelled and allowed to revert back to grassland. The impact by the temporary loss of wet grassland is Not Significant and on reinstatement the effect will be Neutral.

Flood compensation area

Turbine T1 and a section of Site Access Tracks are located within a flood zone. To compensate for permanent infrastructure within the flood zone, two sections of ground (1,037 m² and 3,658 m²) within the flood zone will be excavated to a depth of up to 0.65 m below the 9.6 m flood level. The topsoil will be stripped, the material excavated and the topsoil reinstated to the final levels (details in **Chapter 9: Hydrology and Hydrogeology**

and **Appendix 9.1 Flood Risk Assessment**). The affected areas are wet grassland and improved grassland. The impact by the temporary loss of wet grassland is Not Significant and on reinstatement the effect will be Neutral.

Hedgerow

A section of hedgerow (c.25 m) and wall at site entrance will be removed to facilitate the abnormal load vehicles during delivery of turbine parts. This is a low hedge dominated by hawthorn and without tree standards. The hedgerow will be replanted when the works are complete.

The temporary loss of this hedgerow is considered as an Adverse Impact of Slight Significance and Short-term duration. When the replanted hedge attains a similar height as the removed section, the effect will be Neutral.

6.4.4.3 Disturbance to habitats

Areas adjoining the infrastructure will be disturbed by the construction works, including the need for construction of a drainage system, for the insertion of the electrical cabling including along the Grid Connection route, and for temporary strengthening works along the L6132 component of the TDR.

Such disturbance alongside infrastructure within the wet grassland and improved grassland fields is rated as Not Significant due to the low ecological importance of these grassland habitats

Disturbance to vegetated cutover bog will occur around the location of T2 and its hardstand, and including a stretch of access track leading from T3 area. The extent of the zone of disturbance will vary, with both direct physical disturbance of bog and likely subsequent indirect drying effects on adjoining bog due to hydrological changes (although the hydrology of cutover bog is already highly disturbed). Areas of bog that may become drier would be expected to support more vigorous growth of ling heather *Calluna vulgaris* and less development of bog mosses. The significance of the impact is rated as an Adverse Moderate effect of Medium-term duration. Strict mitigation to minimise disturbance of cutover bog as a result of construction works will be implemented (see **Section 6.5.2.2**).

Disturbance to the adjoining Molinia meadow at the T3 construction area will also occur, though this will likely be very limited. The significance of the impact is rated as an Adverse

Slight effect of Medium-term duration. Strict mitigation to minimise disturbance of Molinia meadow as a result of construction works will be implemented (see **Section 6.5.2.3**).

Grid Connection Route (GCR)

The laying of the grid connection cable will cause localised disturbance to marginal vegetation alongside the roads due to trenching works and use of plant machinery. The amount of disturbance would vary depending on the exact line of the trench but is likely to affect grassy verges and roadside banks or ditches. However, hedging or trees are not expected to be removed to facilitate the works. Generally, there are no terrestrial habitats of significant ecological interest alongside the GCR.

Overall, the disturbance caused to habitats as a result of the works associated with the grid connection is not considered a significant effect. After the backfilling of the trenches and completion of the works, full recovery of the marginal vegetation is likely to take place within 1-2 years.

Turbine Delivery Route

Trees along a section of the Turbine Delivery Route, namely the local road (L6132) from the N68 to the site access, may need to be trimmed back to facilitate the large transport vehicles. This will be done outside of the bird breeding season and the effect is considered Not significant.

Road widening, verge strengthening and vertical realignment of sections of the L6132 will be necessary to support the abnormal load deliveries – as this will be within the public road verge only, which comprises grassy verges, and will not affect roadside hedging, the effect is considered Not significant.

At the three stream crossings along the L6132, steel beams are to be placed along the road resting against the existing carriage way and supported on the verge by sandbags. These steel plates will be placed on 10 metres each side of the water courses. The steel plates will only be in use for the duration of the turbine delivery (as outlined in **Appendix 16.2, Traffic Management Plan**) and will be removed directly afterwards leaving no significant effect on the surrounding area.

An area on the junction with the N68 will be upgraded to support the vehicles by the placement of a load bearing surface in part of the island – this is presently an area of grassland with some willow scrub and brambles (see **Plate 6.26**) and the effect by partial loss of habitat here is considered Not significant.

6.4.4.4 *Changes to existing habitats*

As noted, (**Section 6.4.4.1**), an area of 0.845 ha of conifer plantation will be removed to facilitate the blade set-down area. After use, this area will be levelled and allowed to regenerate naturally. It is likely that rushes and bramble will colonise at first and then scrub. This more open habitat will be of some benefit to small mammals, birds and insects, and overall will be of more value to local biodiversity than the existing conifer plantation. The impact of this change in habitat is rated as a Positive effect of moderate significance.

6.4.4.5 *Potential for Effects on Remnant Raised Bog*

As described, a remnant area of uncut raised bog occurs within the study area (see **Section 6.3.3.4 & Figure 6.4**). While the wind farm design has avoided any direct impacts on the high bog, construction phase activities at the Site have the potential to impact the bog habitat through the alteration of the local hydrogeological regime. Deep excavations can require temporary dewatering which would impact on water levels in the surrounding lands.

The area of high bog is located approximately 40 m south of T2 and 30 m southwest of the proposed site access road towards T2. It is considered that the potential for effects is limited (Imperceptible) given the distance between the proposed works and the area of remnant high bog, and also taking into account its existing modified drainage state (see **Chapter 9: Section 9.6.2.14**).

6.4.5 *Potential Impacts on terrestrial mammals, amphibians and reptiles*

The effect on terrestrial mammal species by the loss and disturbance of mainly wet grassland/semi-improved grassland and cutover bog due to the proposed development is considered to be *Not Significant* on the basis that the species which utilise these habitats are all widespread species of the countryside which will still occur in the immediate area of the Site as well as in the wider environs. In particular, the Irish hare will still occur in area and is likely to avail of growth of emerging grass and herbaceous species along margins of new tracks and with time on the hardstands.

While not recorded in the present baseline assessment, it is known that an otter population is associated with the Moyasta River and animals would commute to Poulmasherry Bay. This population could be affected adversely if contaminants generated during the construction phase, such as suspended solids, hydrocarbons and cementitious materials, were to enter the local watercourses and affect the prey items (fish etc.) of otter. The Aquatic Ecology study (**Chapter 7**) notes that despite previous modifications to the channel of the Moyasta River, and poor to moderate water quality, the river supports a healthy

population of brown trout, and has low densities of sea trout, lampreys, and three spined stickleback (prey items for otter). In the absence of mitigation, the effect on the otter population could be Significant. Mitigation to maintain water quality during the construction and operational phases of the proposed development will minimise the risk to the otter population (see **Chapters 7 & 9** for full details of mitigation which will be implemented to protect water quality).

Construction activity would be expected to cause mammals such as the Irish hare to remain in cover whilst the works are on-going. However, this will be a localised and temporary effect (and not generally relevant to nocturnal mammal activity) and the effect is considered to be Not Significant.

The common frog and common lizard populations would be affected by loss of cutover bog habitat during the construction works, though as the amount of habitat loss is relatively low viable breeding populations of these species are expected to remain elsewhere on Site. Mitigation will be implemented for the common frog to minimise direct impacts on spawn, tadpoles and adult frogs within the construction zone (see **Section 6.5.4**). Mitigation will also be implemented for the common lizard. The significance of the effect on amphibian and reptile species within the Site is rated as Slight.

6.4.6 Potential impact on bats

6.4.6.1 Construction phase impacts on bats

Wind energy developments present four potential risks to bats (NatureScot, 2021):

- Collision mortality, barotrauma and other injuries
- Loss or damage to commuting and foraging habitat
- Loss of, or damage to, roosts
- Displacement of individuals or populations

For each of these four risks, the detailed knowledge of bat distribution and activity within the study area gained during the current assessment is used to predict the potential effects of the wind farm development on bats.

While the site mostly consists of land used for turbary and improved agricultural grassland habitat, with a general lack of roosting opportunities, there exists low productivity foraging habitat and suitable commuting habitat with good connectivity to the surrounding environment.

Hedgerow removal will be required to facilitate the proposed wind farm, with the total loss of hedging amounting to 265 m, which includes a 175 m bat buffer around T1. The impact of this hedgerow loss will be reduced foraging and commuting habitat for bats. Loss of such habitat function has the potential to disturb or displace bats that forage at the site or commute through the site.

The required road widening and realignment works along the L6132 to facilitate the delivery of turbine components will not require any tree or hedgerow removal.

The blade set down area located east of the site will require clear-felling of 0.845 ha of commercial forestry and the removal of a section of hedgerow which adjoins the forestry (approx. 70 m in length). The forestry to be felled consists mostly of sitka spruce. While coniferous plantations that lack specimen trees and are considered less likely to provide potential roosting opportunities for bats (Marnell *et al.*, 2022), this increase in forest edge habitat is likely to increase foraging and commuting locally.

While hedgerows and treelines are common features in the wider landscape, the loss of commuting habits will potentially displace some bats in the immediate locality of works and marginally reduce habitat connectivity locally. It is noted that in the context of wind farm development, it is preferable to reduce habitat connectivity in the immediate locality of turbines to reduce the potential for collision and barotrauma to occur.

No bat roosts were confirmed within the site and surveys were characterised by moderate levels of activity and thus the potential for impacts arising from the proposed wind farm are limited.

No roosting features within trees capable of supporting significant numbers of bats or maternity colony were noted along the grid connection route and thus the potential for impacts arising is unlikely.

Considering the above, potential effects resulting from the construction phase on bats are considered to be **'permanent, slight negative'** effects at a local level following EPA (2022).

6.4.6.2 Operational phase impacts on bats

The operation of the wind farm at this site has the potential to affect commuting and foraging bats. Bat activity at the site was variable with periods of moderate activity occurring for some high collision-risk species. Decreased connectivity resulting from removal of commuting features likely to be used by many bat species (e.g. hedgerows) will persist

during the operational phase, but decreased connectivity to proposed turbine locations is desirable in terms of reducing risk of fatality or injury as a result of contact with rotating turbine blades.

6.4.6.2.1 Collision risk

There is little or no published evidence available on prevalence of bat fatalities at wind farms in an Irish context. Where fatalities have been monitored at wind farms in the USA, most losses have been related to periods of migration (www.nationalwind.org).

Both direct collision with turbine blades and barotrauma resulting from close contact with blades have been reported as an issue for bats at wind farms (e.g. Cryan *et al.* 2009). The susceptibility of bat species likely to be at risk of impacts from wind turbines is partly associated with the likelihood of different species flying at rotor blade height. In an Irish context, Leisler's bat is considered to have a somewhat greater mortality risk at wind farms than the other species recorded on (or adjacent to) the site as this species is a relatively large and high-flying species. Leisler's bats typically do not follow landscape features such as treelines or woodland edges when foraging.

Assessment of collision risk

A general assessment of vulnerability of bat populations to collision with wind turbines, based on best available scientific information, is provided below. This adapts for use in an Irish context from the collision risk scheme provided in NatureScot (2021). For the purposes of this assessment, the results of the most recently completed surveys in 2024 will be considered for the collision risk assessment.

This species collision risk categorisation is used in combination with relative abundance to indicate the potential vulnerability of bat populations. Relative abundance for Irish species was determined in accordance with a scheme for rarity of bat species provided in Wray *et al.* (2010) in combination with best available population data provided in recent Article 17 reports (NPWS, 2019).

The collision risk estimation scheme for Irish bat species is presented in **Table 6.14** below.

Table 6.14: Scheme for estimation of Irish bat species' population vulnerability to wind energy development.

Relative Abundance	Collision-Risk		
	Low	Medium	High
Common (100,000 plus)			Common Pipistrelle Soprano Pipistrelle
Rarer (10,000 – 100,000)	Daubenton's Bat Brown Long-eared Bat		Leisler's Bat

	Lesser Horse-shoe Bat		
Rarest (under 10,000)	Natterer's Bat Whiskered Bat		Nathusius Pipistrelle

Population vulnerability: yellow = low, orange = medium, red = high.

In determining the project specific potential risk to bats, NatureScot (2021) recommends a two-stage process as follows:

- Stage 1: Indicatively assess potential site risk based on consideration of habitat present and development related features (i.e. number of turbines, size of turbines and proximity to other wind farms).
- Stage 2: Overall assessment of risk for high collision-risk species, considering bat activity results and the relative vulnerability of species.

Initially an assessment of the general site risk based on habitats present was carried out following the scheme presented in SNH (2019) and NatureScot (2021). No trees of potential roosting suitability were recorded local to the proposed wind farm site. The site represents a low productivity foraging habitat which could be used by a small number of foraging bats. Although the site is relatively well connected to the surrounding landscape, it is assigned a habitat risk of 'Low' based on the quality of foraging habitat available and the general lack of roosting opportunities within the site. Although the proposed development consists of ≤10 turbines it is considered 'Medium' as there is one proposed and two operational wind farms within 10 km of the proposed project. According to the project size categories in NatureScot (2021), turbines of height >100 m are included in the 'Large' project category. The maximum tip height of the turbines proposed for this development is 150 m, however given the number of turbines (significantly less than the threshold for a large site >40 no. turbines) it is considered that 'Medium' remains the appropriate project size category. Based on the above initial site risk assessment, the proposed project is considered to be 'Medium Risk' to bats and a site risk score of 2 is applicable.

The next stage of the process is applicable to 'high collision-risk' species only and utilises information on the activity level recorded on site in each monitoring period. This assessment is intended to identify projects which are of greatest concern in terms of bat collision risk.

The following high collision-risk species have been recorded at the current site:

- Leisler's bat
- Common pipistrelle
- Soprano pipistrelle
- Nathusius' pipistrelle

Leisler's bats are considered to be a high-collision risk species due to their foraging ecology and flight characteristics. While Leisler's bat is rare in a European context, Ireland is a stronghold for the species. They are classified as 'Rarer' for the purposes of this assessment but the minimum population range for the species in Ireland is estimated at 63,000 to 113,000 (NPWS, 2019) and therefore the species may be 'Common'. Leisler's bats were recorded during activity surveys across the site. Overall activity levels for Leisler's bat in the context of the proposed wind farm are considered 'Moderate'.

Common pipistrelle is a common and widespread species in Ireland and considered to be a high-collision risk species due to their foraging ecology and flight characteristics. Common pipistrelles were one of the most commonly recorded species across the site. Overall activity levels for common pipistrelles in the context of the proposed wind farm are considered 'Moderate to High'.

Soprano pipistrelle is another common and widespread species in Ireland which is considered to be a high-collision risk species due to their foraging ecology and flight characteristics. Overall activity levels for soprano pipistrelles in the context of the proposed wind farm are considered to be 'Moderate'.

Nathusius' pipistrelle has a fast flight and is slightly less agile in flight than the other pipistrelle species and is positively associated with broadleaf woodland and areas where pasture is less extensive (Roche *et al.* 2014). This species is considered to be of high-collision risk due to their foraging ecology and flight characteristics. Nathusius' pipistrelle was only recorded in spring and autumn, yielding an overall 'Low' activity category.

Table 6.15: Overall collision risk assessment of relevant (high-risk) species.

	Species	Site Risk Level	Activity Category	Overall Assessment
Spring 2024	Leisler's Bat	2	Low to Moderate (2)	4
	Common Pipistrelle	2	Low to Moderate (2)	4
	Soprano Pipistrelle	2	Low to Moderate (2)	4
	Nathusius' Pipistrelle	2	Low (1)	2
Summer 2024	Leisler's Bat	2	Low to Moderate (2)	4
	Common Pipistrelle	2	Low to Moderate (2)	4
	Soprano Pipistrelle	2	Low to Moderate (2)	4
Autumn 2024	Leisler's Bat	2	Low to Moderate (2)	4
	Common Pipistrelle	2	Low to Moderate (2)	4
	Soprano Pipistrelle	2	Low to Moderate (2)	4
	Nathusius' Pipistrelle	2	Low (1)	2

While activity levels of the above species varied between survey locations it is not possible to determine with any accuracy the different levels of collision risk presented by individual turbines (NatureScot, 2021).

As per NatureScot (2021) there is no requirement to complete an overall risk assessment for low-risk species. The low-risk species recorded at this proposed wind farm site were brown long-eared bat, Daubenton's bat, Natterer's bat and whiskered bat. Overall activity levels were low for these species and by the virtue of their low potential vulnerability to wind energy developments, no significant collision related risk is likely.

No additional loss of foraging and commuting habitat, relative to that discussed above in relation to the construction phase, will occur during the operational phase. No other significant impacts are likely to occur on bats during the operation phase of the proposed wind farm.

Overall, the proposed wind farm in its operational phase is likely to have a '**permanent, slight negative**' effect on bats at a local level (following EPA, 2022).

6.4.6.3 Decommissioning phase impacts on bats

No other potential impacts other than those already discussed above for the construction and operational phases are likely to occur during decommissioning. Decommissioning activities are assumed to be similar to construction activities, having similar type risks and sensitive receptors associated with them. However, they are considerably less intrusive.

Overall, the effect of potential impacts on bats during decommissioning of the proposed wind farm is considered to be '**neutral**' at a local level following EPA (2022).

6.4.7 Impacts on birds

For birds, the following predicted or potential impacts are considered:

- Loss of habitats
- Potential disturbance to birds during construction
- Potential displacement of birds during operation
- Potential effects from noise during operation
- Potential barrier effect by presence of turbines
- Predicted collision risk to birds
- Potential effects on birds outside of wind farm study area

6.4.7.1 Loss of habitats

The permanent loss of habitat to facilitate the construction of the proposed Development is approximately 3.99 ha. The breakdown of habitats that will be lost permanently and temporarily to the Project are listed in **Table 6.13 (Section 6.4.4)**.

The majority of habitat loss is wet grassland (often semi-improved). While some bird species of conservation importance are associated with such grassland habitat, mainly for foraging purposes including hen harrier and kestrel, none are dependent on wet grassland for breeding and/or wintering requirements. Direct loss of suitable foraging habitat for these species will be minimal in the context of retained foraging habitat adjacent to the proposed development and in the wider landscape. As such, the local availability of prey for these and other species will not be significantly affected.

On the basis that a relatively small amount of wet grassland is being lost, and noting that wet grassland is an abundant habitat in the wider area of the project Site, the effect on birds due to the loss of wet grassland to facilitate the proposed Development is considered Not Significant. This limited potential for adverse effects will be further reduced by the mitigation described in **Sections 6.5.2 and 6.5.6**.

The construction of turbine T2 will result in the loss of an estimated 0.8 ha of cutover bog. The cutover bog at this Site supports breeding meadow pipit (Red-listed) and skylark (Amber-listed), as well as wintering snipe (Red-listed), and is used as foraging habitat by species such as hen harrier and kestrel. The effect on birds due to the loss of cutover bog to facilitate the proposed Development is considered an Adverse effect of Slight significance and Permanent duration. It is noted that the loss of cutover bog will be off-set through the provision of a Biodiversity Enhancement and Management Plan (see **Appendix 6.11**), which will enhance an area (4.04 ha) of former cutover bog now dominated by rushy wet grassland. The successful implementation of the BEMP is likely to result in a Positive effect in the long-term, as a larger area of cutover bog will be available for breeding, wintering and hunting bird species.

While there appears to be no published reports in Ireland on post-construction monitoring of bird populations at wind farms, observations from a range of wind farms throughout the island of Ireland by the author of this report (Dr Brian Madden) and others indicate that passerine bird species, such as meadow pipit and skylark, are generally present in operational wind farm sites (where suitable habitat exists) and show no displacement effect due to the presence of the turbines. This is in line with published accounts which note that passerine species are generally not affected by wind farm development (see SNH Guidance 2017).

Birds of prey, including kestrel, are also regularly observed in wind farm sites and their presence may lead to risk of collision with turbines (see **Section 6.4.7.6**).

While the proposed development will result in the loss of some habitat for birds and in localised disturbance of habitats at the proposed Site, it is considered this is not likely to result in significant declines in any bird species at the proposed Development Site due to:

- (i) the relatively small scale of the habitat loss; and
- (ii) the enhanced habitat that will be supplied through the Biodiversity Enhancement and Management Plan

6.4.7.2 Disturbance to birds during construction

The construction phase for the Proposed Development is anticipated to last between 36-40 weeks. In this period, on-site activities, including civil works and turbine erection works, have potential to cause disturbance effects on birds in areas adjoining the works.

Scottish Natural Heritage (2016) write “Different bird species have different tolerance levels to disturbance. Even within species, disturbance distance can vary according to time of year or geographical location. Some sensitive species may be disturbed by activity as much as 750m away.” SNH have published “*A review of disturbance distances in selected bird species*” prepared by Ruddock and Whitfield (2007). This review included 26 ‘priority’ species and was based largely on expert opinion. The 2007 guidance note was replaced in 2022 by “*Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species*” (NatureScot Research Report 1283) prepared by Goodship and Furness. The 2022 review included 65 bird species.

It is noted that passerine species, such as meadow pipit and skylark, are not perceived as being prone to disturbance by wind farm construction (SNH 2017) and indeed Pearce Higgins *et al.* (2012) found that densities of skylarks and stonechats increased on wind farms during construction.

During the baseline surveys carried out from 2020 to 2024, there was no evidence that any of the identified target species (as listed in **Table 6.10**), which could be perceived as sensitive to construction disturbance, have breeding populations within the Site.

As it is noted that potential suitable breeding habitat occurs within or around the site for a number of species which have a presence in the area (as shown by the baseline surveys), focused pre-construction surveys will be undertaken for these species to establish if the local breeding status has changed by the time of construction (see **Section 6.8.4**).

Should pre-construction breeding surveys indicate a requirement for protection from construction-related disturbance for any relevant species, appropriate measures (as described in **Section 6.5.6.1.2**) will be taken to comply with all relevant legislation and best practice guidance available at the time.

The baseline surveys carried out from 2020 to 2024 indicated that several target species, while not breeding or roosting within the site, utilise it for foraging and hunting throughout the year. Principal among the species are hen harrier, kestrel and, to a lesser extent, merlin. As with any construction site or work area, most birds will avoid areas with human activity.

If approaching the area, the birds are likely to deviate away from the core work area but would likely continue foraging in nearby fields or areas of bog. While the extent of an avoidance effect will depend on the extent of the work area and the type of activity, as well

as on local topography, some effect is likely. It is considered that the significance of the effect would be from Slight to possibly Moderate but of Temporary duration.

6.4.7.3 *Displacement of birds during operation*

Displacement of birds from otherwise suitable habitat as a result of the presence of wind turbines has been reported. (Drewitt & Langston 2006, de Lucas *et al.* 2007, Pearce-Higgins *et al.* 2009). The displacement is believed to occur as a result of behavioural responses that prevent or decrease the use of an area for activities such as nesting, foraging or roosting. However, the results of studies on potential displacement have varied widely. In an overall review of the literature Madders & Whitfield (2006) concluded that displacement effects of wind turbines on raptors are negligible for the most part. In a review of potential displacement effects on upland breeding bird densities at twelve wind farm sites in Britain, Pearce-Higgins *et al.* (2009) reported that seven of the twelve species studied exhibited significantly lower frequencies of occurrence close to the turbines. It is noted that passerine species, including species such as meadow pipit, are not perceived as being prone to displacement as a result of the presence of wind turbines (SNH 2017).

Consideration of potential for displacement is given for the following target species which were recorded on a regular basis (at least 5 records over the study period) within the study area:

Hen harrier

The baseline surveys showed that hen harrier was a regular visitor to the area of the wind farm site in both summer and winter. The origin of the birds in summer is likely a breeding population located less than 5 km from the site, while those in winter are likely to be associated with winter roosts at distances of 4-5 km of the site.

In the review of upland raptors and wind farms, Madders and Whitfield (2006) tentatively rated foraging hen harriers as having a 'low-medium' sensitivity to displacement. They note that results at Argyll and Northern Ireland sites suggest that foraging may be little affected but local displacement of nesting attempts may occur in the order of 200-300 m around turbines. In a study of the usage of the Derrybrien Wind Farm, Co. Galway by hen harriers, Madden & Porter (2007), reported birds both foraging and flying through the wind farm. Some birds were observed flying close to wind turbines (<50 m) and on one occasion within 10 m of the base. Pearce-Higgins *et al.* (2009) cited a predicted reduction in flight activity of 52.5% within 500 m of the turbine array for breeding birds.

Wilson *et al.* (2015) studied the movement of adult hen harriers at wind farm and control sites in Ireland using GPS tags and data collected during vantage point watches. The study aimed to determine whether habitat use by foraging hen harriers differed at wind farm and control sites. The study found that at wind farm sites, hen harriers favoured open habitats over afforested areas. Hen harriers at control sites foraged preferentially over peatland and young forest plantations, while those at wind farm sites foraged preferentially over natural and semi-natural open habitats (i.e. scrub, rough grassland) and to a lesser extent over peatland. While the authors noted that the selection of the somewhat different foraging habitats between the wind farm and control sites is difficult to explain, the study demonstrated that wind farms were actively used for foraging purposes.

As part of the site of the proposed development is considered to be within the range of both breeding and wintering hen harriers, and accepting that the evidence for avoidance of turbines by foraging birds is somewhat contradictory, it is expected that the species could show some signs of displacement around the turbines at the proposed development site. It is likely that any displacement effect would be highest in the early period of operation, with some degree of habituation occurring over time. Significance of potential effect is rated as Slight to Moderate and of short-term duration (1-7 years).

Sparrowhawk

The baseline surveys showed that sparrowhawk is a scarce visitor at the Proposed Development Site, with records mostly involving birds hunting.

There appears to be no data to show whether sparrowhawk is displaced from an area around turbines, though in the review of upland raptors and wind farms, for sharp-shinned hawk (*Accipiter striatus*) (same genus as sparrowhawk) Madders and Whitfield (2006) tentatively rated this North American hawk as having a 'low' sensitivity to displacement.

As sparrowhawk is a woodland species that nests in woodland and hunts largely along woodland margins and over scrub, it is expected that the species will not be displaced from marginal scrub or hedgerow habitat in the vicinity of turbines at the Proposed Development Site - significance of potential effect rated as Imperceptible or Not significant.

Buzzard

The baseline surveys showed that buzzard is a scarce species at the Proposed Development Site, with records involving birds hunting and/or flying.

In the review of upland raptors and wind farms, Madders and Whitfield (2006) tentatively rated foraging buzzards as having a 'low-medium' sensitivity to displacement. Pearce-Higgins *et al.* (2009) cited a predicted reduction in flight activity of 41.4% within 500 m of the turbine array for breeding birds.

While buzzard is a scarce species in the area proposed for the wind farm at Moanmore Lower, it is expected that the species could show some signs of displacement around the turbines at the proposed Development site. It is likely that any displacement effect would be highest in the early period of operation, with some degree of habituation occurring over time. Significance of potential effect is rated as Slight and of short- to medium-term duration.

Merlin

Merlin was recorded in the study area mostly in winter, with one record in April (possibly from a local breeding territory or a bird on passage).

There appears to be no data to show whether merlin is displaced from an area around turbines, though in the review of upland raptors and wind farms, for prairie falcon (*Falco mexicanus*) (same genus as merlin) Madders and Whitfield (2006) tentatively rated this North American falcon as having a 'low' sensitivity to displacement.

As merlin is a species that nests in trees or on open bog and hunts close to ground level, it is expected that the species will not be displaced from suitable habitat in the vicinity of turbines at the proposed Development site - significance of potential effect rated as Not significant.

Kestrel

Kestrel was recorded regularly through the year during the baseline surveys, with breeding likely within a 1-2 km radius of the site for the Proposed Development. The baseline data show that the species uses the survey area for hunting purposes.

In the review of upland raptors and wind farms, Madders and Whitfield (2006) rated kestrel as having a 'low' sensitivity to displacement. The related American kestrel (*Falco sparverius*) was also given a rating of 'low' sensitivity. Pearce-Higgins *et al.* (2009) found equivocal evidence for weak avoidance of turbines by kestrel.

For kestrel, the significance of a potential displacement effect is rated as Not significant.

Snipe

The baseline surveys showed that snipe is a winter/passage visitor to the Site, with no evidence of breeding on site.

While there is evidence to show that breeding snipe may avoid suitable habitat around turbines, it is considered unlikely that the presence of the wind farm Development would have adverse effects on snipe utilising the local bog outside of the breeding season, as snipe is a particularly widespread species during winter and may often occur in active agricultural lands.

The significance of the potential displacement effect on wintering birds is rated as Imperceptible or Not significant.

Lesser black-backed gull and Herring gull

Both gull species were recorded regularly flying through the study area. While gulls may utilise local fields at time of silage cutting, there was no evidence of usage of the study site. It is considered unlikely that the presence of the turbines would cause displacement of gulls from the area.

6.4.7.4 Potential effect of noise on birds during operation

Many animal species rely on acoustic signals to communicate messages, which are critical to survival. However, noise from anthropogenic sources, such as traffic, industrial and commercial facilities, or wind farms, could impede the transmission of these signals. Birds in particular depend on acoustic signals and the masking effect of anthropogenic noise could have direct fitness consequences.

At the proposed Moanmore Lower site, there is already a background level of noise (albeit relatively low), including local traffic and farming activities. The effects from operational disturbance due to additional noise, and human activity associated with the proposed project, for bird species within the wind farm site, which are considered to be relatively tolerant to such disturbance and are likely to quickly habituate to the new levels of 'background' disturbance, within the wind farm site are likely to be non-significant. In addition, any areas subject to higher levels of noise disturbance will be small-scale in the context of the adjoining undisturbed suitable habitat within the site and the wider landscape. As such, noise effects on bird species during the operational phase are deemed not significant.

6.4.7.5 Potential barrier effect due to turbines

The potential impact of lines or groups of wind turbines creating a barrier effect to passing birds is mostly relevant to locations where migratory species pass regularly. Rees (2012) cites eight published studies of flight behaviour which reported changes in flightlines for swans or geese initially seen heading towards turbines, at distances ranging from a few hundred metres to 5 km (the larger distances were by birds on migration); 50-100% of individuals/ groups avoided entering the area between turbines, but in some cases the sample sizes were small.

As the proposed Site has not been identified through the baseline surveys or desktop review as being along a migration or commuting route for birds, such as wetland species (swans, geese, waders etc.) or migrating birds of prey, significant cumulative displacement/barrier risk effects are not likely.

6.4.7.6 Collision

Collision risk posed to bird species is one of the main environmental concerns associated with wind energy developments (Drewitt & Langston 2006, Band *et al.* 2007, Drewitt & Langston 2008, Watson *et al.* 2018, Diffendorfer *et al.* 2021)). However, bird species differ widely in their susceptibility to collision mortality. Essentially, birds are at risk of collision only when their flight path overlaps with the rotor blade sweep area of a turbine. It follows that birds whose flight heights coincide with the height of the turbine rotor sweep area are most at risk. It is generally considered that passerine species are less susceptible to collision with turbines than non-passerine species and especially waterfowl and raptor species (SNH 2017).

Collision Risk Modelling (CRM) is a method to estimate the number of birds likely to collide with turbines at the Site. This method uses vantage point data to calculate the risk of collision. In this case, the vantage point data collected over the period 2020-2024 (three breeding seasons and four winter seasons) at the Site were used. Two stages are involved in the model:

Stage 1: Vantage point observations of birds flying within the study area are used to calculate the number of birds likely to fly through areas swept by the proposed turbine blades.

Stage 2: Calculation of the probability of a bird strike occurring.

Full details of the collision risk modelling method and results are given in **Appendix 6.10**. Summary details of the key species recorded which may be sensitive to collision risk are given in **Table 6.16**.

Table 6.16: Summary of estimated number of collisions for key ornithological receptors over the lifetime of the project (see Appendix 6.10 for all species).

Species	Estimated Collisions over Lifetime of Wind Farm (30 yrs)	Estimated Collisions per Year	One Bird Collision every 'x' years
Little egret	0.34 birds	0.011	90.91 yrs
Grey heron	1.0 bird	0.048	20.83 yrs
Hen harrier – summer (Apr-Aug)	0.56 birds	0.019	52.63 yrs
Hen harrier – winter (Sep-Mar)	0.51 birds	0.017	58.82 yrs
Sparrowhawk	0.10 birds	0.0034	294 yrs
Buzzard	5.0 birds	0.17	5.88 yrs
Kestrel	44 birds	1.5	0.67 yrs
Merlin	0.030 birds	0.0011	909 yrs
Peregrine	0.0050 birds	0.00018	> 5,000 yrs
Lapwing	0.40 birds	0.013	76.92 yrs
Whimbrel (Apr-May)	3.0 birds	0.10	10 yrs
Curlew	0.02 birds	0.007	142 yrs
Greenshank	0.08 birds	0.0025	400 yrs
Lesser black-back gull (Apr-Jul)	0.45 birds	0.015	66.6 yrs
Herring gull (Apr-Aug)	0.66 birds	0.022	45.45 yrs

Only five of the species analysed, grey heron, hen harrier, buzzard, kestrel and whimbrel, have a collision risk of more than one bird over the entire lifetime of the project. These species are considered further below (starting with species showing highest risk). For all the other species, the significance of collision risk is rated as Imperceptible and/or Not Significant.

Kestrel

For kestrel, the collision risk modelling has calculated a rate of 44 collisions over the lifetime of the Development (i.e. 30 years) or 1.5 casualties per year. [It is noted that there may have been some approximations in the recording of kestrel flight activity that resulted in over-estimation of the predicted collision risk – see **Appendix 6.10, Section 6.2**].

While these rates are negligible in the context of the estimated national population of 13,500 birds (Lewis *et al.* 2019), any loss of a Red-list species is of some significance in a local context. It is noted that kestrel, as well as lesser kestrel (*Falco naumanni*) and American

kestrel (*Falco sparverius*), is a genus that is prone to collision (see for instance Barrios & Redrigues 2004, Hotker *et al.* 2006, Hotker 2008, Lucas *et al.* 2008, Marques *et al.* 2014, Diffendorfer *et al.* 2021). This is expected to be due to the hovering behaviour of the species. While birds are hunting and focusing on ground prey, they may be unaware of the turbine position or may suddenly change their position due to a gust of wind. The hovering height level is often within the rotor sweep of the turbines.

Taking into account the conservation status (Red list) of the species and the known susceptibility of the genus to collision, the significance of collision risk at a population level is rated as a Long-term Slight Adverse effect at a local level.

Buzzard

For buzzard, the collision risk modelling has calculated a rate of 5 collisions over the lifetime of the Development or 0.17 casualties per year. While the size of the bird and its tendency to fly relatively low and within the potential collision risk zone makes buzzard prone to collision, the favourable conservation status of this species (Green-listed) limits the potential for ecologically significant effects to result. However, on a precautionary basis, the significance of collision risk is rated as a Long-term Slight Adverse effect at a local level.

Whimbrel

For whimbrel, the collision risk modelling has calculated a rate of 3 collisions over the lifetime of the Development or 0.1 casualties per year. In Ireland, whimbrel is a mainly a spring migrant, with birds usually passing directly northwards to breeding grounds. Depending on local weather conditions, flocks may at time fly at low levels and hence be prone to collision, especially during hours of darkness.

With whimbrel having a favourable conservation status (Green-listed) in Ireland, the effect of the predicted loss of 3 birds over the lifetime of the project is considered as Not Significant.

Hen harrier

For hen harrier, the collision risk modelling (summed breeding and non-breeding seasons) has calculated a rate of 1.07 collisions over the lifetime of the Development (i.e. 30 years) or 0.036 casualties per year.

While these rates are negligible in the context of the estimated national population of 85-106 breeding pairs (Ruddock *et al.*, 2024), any loss of an Annex I listed species is of some significance.

Taking into account the high conservation status of the species, as well as a national population that is in long-term decline (Ruddock *et al.* 2024), the significance of collision risk at a population level is rated as a Long-term Slight Adverse effect at a national level.

Grey heron

For grey heron, the collision risk modelling has calculated a rate of 1 collision over the lifetime of the Development or 0.048 casualties per year. While the size of the bird and its tendency to fly relatively low and within the potential collision risk zone makes grey heron prone to collision, the favourable conservation status of this species (Green-listed) limits the potential for ecologically significant effects to result. With a predicted loss of 1 bird over the lifetime of the project, the significance of the collision risk to grey heron is considered as Not Significant.

6.4.7.7 Potential effects on birds outside of wind farm study area

The hinterland surveys to a distance of approximately 5 km from the location for the proposed Development did not identify any unknown areas of habitat of particular value for supporting concentrations of bird species of conservation importance. While species such as sparrowhawk, buzzard and kestrel, as well as little egret and gull species, were observed at various locations in the hinterland area, the presence of the proposed Development is not likely to have any measurable effects on these species, i.e. not significant.

The hinterland surveys, as well as the winter wetland surveys, confirmed that the various small lakes, namely Tullabrack Lough and Moanmore Lough, support small number of wetland birds at a local level of importance, including mallard, wigeon, teal, tufted duck, and whooper swan. As the site for the proposed wind farm does not have habitat to support these species, it is concluded that the construction and/or operation of the proposed Development is not likely to have significant effects on any of bird species associated with these lake sites.

6.4.7.8 Potential effects on wetland birds associated with the River Shannon

The wetland bird surveys were focused on the Poulmasherry Bay and the section of the River Shannon shore from Kilrush to Knock (outer Clonderalaw Bay). These estuarine wetlands are at respective distances of approximately 1.2 km and 3 km (minimum) from the

site of the proposed wind farm. The winter surveys confirmed the importance of the Shannon estuary for wetland birds, with the entire system rated as of international importance.

It is noted that, apart from snipe, the site for the proposed development does not have suitable habitats to support on a regular basis any of the bird species associated with the Shannon system. While the vantage point surveys recorded flightlines over the site for some wader species that may be associated with the Shannon, namely golden plover (1 record of single bird), lapwing, whimbrel, curlew (1 record of single bird) and greenshank (2 records), the numbers involved and the frequency of occurrence were low. The records of gull species also involved low numbers and low frequency of occurrence. On this basis, it is concluded that the construction and/or operation of the proposed Development is not likely to have significant effects, including risk of collision, on any wetland bird species associated with the Shannon estuarine system.

However, as the proposed development site drains to the Poulnasherry Bay component of the River Shannon system, there is potential for adverse effects on the habitats and food supplies of the waterbird species should contaminants enter the system as a result of the construction and operation phases of the proposed development. In the absence of mitigation, this is potentially a Significant Adverse Effect of Short-term Duration. Appropriate mitigation measures to minimise any effects are discussed in **Chapter 9: Hydrology and Hydrogeology** and in the accompanying NIS.

6.4.8 Decommissioning Phase Impacts

Decommissioning of the Development will result in the cessation of renewable energy generation at the end of the operational life of the proposed Development with the removal of various infrastructural elements.

All Site access tracks and Turbine Hardstand areas forming part of a Site access track network which are required by wind farm operation and maintenance staff for ongoing agricultural operations will be left in situ for future use.

It is intended that all above ground components and underground cabling (ducting left in-situ) will be removed from the Site as part of the decommissioning of the Development. The approach proposed for Decommissioning is one of minimal intervention.

The following elements are included in the decommissioning phase:

- Decommissioning works will be limited to removal of the proposed Development structures, *i.e.* removal of turbines, Electrical Substation and cabling.
- Site access tracks and associated drainage systems will remain in place to serve ongoing agriculture activity.
- Hardstanding areas will be allowed to revegetate naturally.
- Turbine plinths will be removed, and the hardcore surface area covering turbine foundations will be allowed to revegetate naturally.
- Soil disturbance will be avoided.
- Importing soil is not a preferred option. If this is to be considered, it will be as a last resort only. If it is nonetheless considered necessary to import soil, it will be a peat based soil. Mineral soil will not be brought into the Site. Any decision to import peat soil will need to carefully balance any benefits of doing so against the ecological and hydrological impacts of excavating it elsewhere.

A Decommissioning and Restoration Plan has been prepared as part of the planning application for the Development (see **Appendix 2.1 CEMP: Appendix D Decommissioning Plan**). The key targets of the Plan are as follows:

- Ensure decommissioning works and activities are completed in accordance with relevant updated mitigation and best practice approach presented in the accompanying Environmental Impact Assessment Report (EIAR) and associated planning documentation, and relevant surveys to accompany the works program.
- Ensure decommissioning works and activities have minimal impact/disturbance to local landowners and the local community. This will relate to transport, particularly of material off site with noise and dust also impacting on receptors at time of decommissioning to a lesser extent.
- Ensure decommissioning works and activities have minimal impact on the natural environment. Disturbance to habitats will be avoided and the use of existing infrastructure and drainage will ensure silt does not enter waterways.
- Adopt a sustainable approach to decommissioning. This means comparing alternative methods for turbine disassembly and taking the relevant best practice approach with the least impact on the natural environment; and,
- Provide toolbox talks, environmental training and awareness of sensitive receptors, informed by updated surveys and waste management within the Site for all project personnel.

From the perspective of terrestrial ecology, the anticipated potential impacts would be:

- disturbance to the cutover bog at T2 location and Molinia meadow at T3 location

- disturbance to breeding birds and protected mammal species which may be on Site at the time informed by updated surveys
- potential pollution of local waterways and ultimately Poulasherry Bay and the Shannon system
- creation of new habitats on Site informed by updated surveys

6.4.8.1 Disturbance of cutover bog and Molinia meadow during decommissioning works

The cutover bog and Molinia meadow habitats on Site are of significant ecological importance and any disturbance to the bog and Molinia meadow during the works to dismantle turbines no. 2 and no. 3 respectively would be an adverse impact of potential significance. The Decommissioning and Restoration Plan has a target of minimal impact on the natural environment and it is not anticipated that personnel will need to traverse out onto the bog or grassland areas for any reason. The Plan also highlights a target of providing training on sensitive receptors on Site to all involved personnel.

With work carried out in accordance with the Plan, and informed by updated surveys, it is not likely that the Decommissioning works will have adverse effects on the cutover bog or Molinia meadow habitats on Site.

6.4.8.2 Disturbance of breeding birds and other fauna species

Particular care will be taken to ensure that the Decommissioning works do not cause disturbance to animal species occurring on Site at the time. Pre-demolition/dismantling baseline surveys will be carried out for species identified of conservation importance during the 2020-24 baseline surveys, as well as for further species of importance which may be on Site at the time of the works. Relevant legislation relating to flora and fauna in force at the time will be strictly adhered to.

Mitigation measures described in the present report to avoid or minimise disturbance to protected fauna species will be implemented as necessary.

With the above approach followed, significant effects on fauna species associated with the Site are not likely from the Decommissioning works.

6.4.8.3 Maintenance of water quality during decommissioning works

The issue of potential effects on hydrology is reviewed in **Chapter 9: Hydrology and Hydrogeology (Section 9.6.4)**. The assessment notes the following:

The potential effects associated with decommissioning will be similar to those associated with construction but of a reduced magnitude, due to the reduced scale of the proposed decommissioning works in comparison to construction phase works.

Turbine foundations will remain and will be covered with earth and allowed to revegetate. Site access tracks will continue to be used as amenity pathways and will therefore not be removed. The underground cables will be cut and tied, and the ducting will be left in place. Excavation and removal of this infrastructure would result in considerable disturbance to the local environment in terms of disturbance to underlying soils and an increased sedimentation (if turbine foundations and hardstands are being reinstated there is a risk of silt-laden run-off entering receiving waters) and an increased possibility of contamination of local groundwater.

Prior to the Decommissioning work, a comprehensive plan will be drawn up that takes account of the findings of this EIAR and the contemporary best practice at that time, to manage and control the component removal and ground reinstatement.

Mitigation measures to avoid contamination by accidental fuel leakage and compaction of soil by on-site plant will be implemented as per the construction phase mitigation measures.

No significant effects on the hydrological and hydrogeological environment are envisaged during the decommissioning phase of the Project.

With mitigation in place, it is likely that the Decommissioning works will not result in any significant adverse effects on local watercourses and in turn the River Shannon system and associated European sites.

6.4.8.4 Creation of new habitat

The Decommissioning Plan specifies that the turbine hard stands will be allowed to naturally revegetate. At the time of Decommissioning, parts of the hardcore surface will likely already support a sparse flora of annual and perennial species (this is normal to see at operational wind farms after a few years and indeed often attracts sheep to graze the tender shoots). The amount of vegetation that will eventually colonise will depend on the chemical character of the gravel surface, e.g. a calcareous substrate would support a higher diversity of plants than an acidic substrate. Such recolonising surfaces, which retain warmth in sunshine compared to surrounding areas of soil, tend to attract insects (butterflies etc) as well as passerine bird species such as skylark and various finches, with the birds feeding on seeds

from plants. The habitat that would be expected to develop is likely to fall into a mosaic of semi-natural grassland (GS) and artificial stone surfaces (BL3).

The natural re-vegetation of the above-mentioned surfaces is rated as a Positive effect of Moderate significance.

6.4.9 Potential Impacts from Invasive Species

One Third Schedule listed invasive species was recorded within the project area (see **Section 6.3.3.8**) - this was a stand of Japanese knotweed *Fallopia japonica* along the channel of the Brisla East Stream to the south side of the L6132 (route of turbine delivery). Another species, *Gunnera* spp., while not recorded in baseline surveys is known from within a 5 km distance of the Site.

The proposed development is not likely to have any effects on the location of the Japanese knotweed for the following reasons:

- the location of the plant is several metres upstream of the road edge
- the proposed verge strengthening works required here merely involve the placement of a steel plate along the verge for 10m each side of watercourse crossing to avoid excavation and disturbance of the existing ground. The steel plate will be removed from the verge when the deliveries are complete. There will be no instream or bankside works along the stream.

As more than two years are expected to have passed from the time of the baseline surveys and the commencement of works (subject to planning permission), pre-construction surveys will be carried out to check for the further spread of Japanese knotweed (a species that is widespread in Co. Clare) and any other invasive species within the study area.

6.4.10 Cumulative Impacts

There are 16 operational, consented and proposed wind farms within 20 km of the proposed Development (details are given in **Table 2.1** and **Figure 2.1** of **Chapter 2**). The nearest operational wind farm is Moanmore Wind Farm (7 turbines), which is located approximately 1.7 km to the northeast of the Site. Also in the immediate area is Tullabrack Wind Farm (6 turbines), which is located approximately 2.16 km to the east. The remaining operational or consented wind farms are at distances of between 12.71 km and 18.31 km from the Site. Of these, eight are located south of the Shannon Estuary in Co. Kerry. The proposed Ballykett Wind Farm (4 turbines) is located at a distance of 0.96 km from the Site.

Some of these wind projects are at least partly located on blanket bog and wet heath, such as Booltiagh, or cutover raised bog, such as Moanmore and Tullabrack. Other habitats within the various wind farm sites include wet grassland, improved or semi-improved grassland and conifer plantation. While the proposed Moanmore Lower Development would contribute (by an estimated 0.88 ha) to a cumulative loss of cutover raised bog in the region, this loss is likely to be offset in the long-term by the implementation of the Biodiversity Enhancement and Management Plan. The proposed Development also would contribute to a cumulative loss of wet grassland and conifer plantation but this is not considered a significant effect as these habitats are widespread in distribution and of low ecological interest.

Other Developments

The only other major development or proposed development (larger than a one-off house) within 10 km of the Site are the developments or proposed developments listed in **EIAR Chapter 2: Table 2.2.** and relating to period 2017 to 2022. These include agricultural facilities (no. 3), a solar energy development, water storage tanks within the Moneypoint power station complex, a waste water treatment works & a sewerage scheme (Kilrush), amenity facilities (inc. a 9-hole pitch and putt course) and an apartment development in an existing convent structure.

It is noted that projects such as solar farms and pitch and putt courses continue to support a range of habitats and native flora and fauna species. As the proposed Development, with mitigation in place, will not be likely to result in any significant effect on terrestrial ecological interests at the Site or in the wider area, it will not contribute to any possible cumulative impact when considered with the various other projects within a 10 km radius.

The surveys undertaken for Aquatic Ecology assessment (**Chapter 7**) have shown that the local watercourses, and notably the Moyasta River, currently have Moderate to Poor water quality. There was evidence of eutrophication at the sampling sites within the Moyasta River, with an abundance of filamentous green algae. With respect to hydrology, the proposed Development, with mitigation in place (as detailed in **Chapter 9 Hydrology and Hydrogeology**), is considered unlikely to significantly contribute to cumulative effects in terms of water quality.

6.5 MITIGATION MEASURES

6.5.1 Designated sites

This report has identified pathways between the proposed Project and two European sites, as well as the Poulnasherry Bay pNHA. The pathways are via the local drainage system and the Moyasta River.

In the absence of mitigation, there is a risk that contaminants generated on Site during the construction phase, as well as the operational and decommissioning phases, could enter local watercourses and ultimately flow to the designated sites where there could be adverse effects on water quality, aquatic life and relevant qualifying interests within the sites. Mitigation is therefore required to eliminate this risk or at least to reduce it to a non-significant level this risk.

The mitigation proposed to maintain water quality in the drainage channels and watercourses which drain the Site are detailed in **Chapter 9. Hydrology and Hydrogeology** and all measures are contained in the CEMP (**Appendix 2.1**). The implementation of mitigation through avoidance principles, pollution control measures, surface water drainage measures and other preventative measures have been incorporated into the project design in order to minimise potential significant adverse impacts on water quality at the Site. A 50 m buffer zone around watercourses and at least a 10 m buffer at main drains will be implemented at the Site which will largely result in the avoidance of sensitive hydrological features. Direct discharges to surface waters of dewatered loads will not be permitted under any circumstances. This in turn will avoid or reduce the potential for adverse impacts on downstream designated sites.

As noted, all of the mitigation measures described in **Chapter 9** are contained in the Construction and Environmental Management Plan (CEMP) (see **Appendix 2.1**). The CEMP provides a contractual commitment to mitigation and monitoring and reduces the risk of pollution whilst improving the sustainable management of resources. The environmental mitigation for the Project will be managed through the CEMP and will be secured in contract documentation and arrangements for construction and later phases, to ensure there will be a robust mechanism in place for their implementation. The CEMP addresses the construction phase, and will be continued through to the commissioning, operation and final decommissioning phases.

The CEMP requires the contractor to appoint an Ecological Clerk of Works (ECoW), with experience in overseeing wind farm construction projects, for the duration of the

construction phase. The ECoW will have responsibility for ensuring the CEMP is implemented and have oversight for compliance with all planning conditions relating to ecology.

With such mitigation in place and rigorously enforced and monitored, it can be concluded that there would not be any significant effects on the qualifying interests of the identified designated sites as a result of the proposed Project.

The above mitigation will apply to all watercourses associated with the Project site and will thus provide protection to all downstream aquatic receptors including Poulnasherry Bay and the Shannon estuary.

6.5.2 Habitats

6.5.2.1 Mitigation for habitat loss

The project will result in the permanent loss of an estimated 3.9 ha of habitats on Site. The majority of the habitat loss at the wind farm site comprises wet grassland or semi-improved/improved grassland, which is not of significant conservation importance and is not rated as a key ecological receptor.

However, there will be loss of: (i) an area of approximately 0.8 ha of cutover bog, rated as a Significant Negative effect, as a result of the construction of T2 turbine, and (ii) a small area (200 m²) of Molinia meadow as a result of the construction of T3 turbine, rated as a Slight Negative effect. These losses will be offset through a Biodiversity Enhancement and Management Plan (see **Section 6.7** below and **Appendix 6.11**).

An estimated 20 m of hedging will be lost permanently due to a new access track on approach to T3. A further 70 m of former hedging (now an overgrown willow strip) will be lost permanently at the entrance to the blade transfer area at Tullabrack East. In addition, an estimated 175 m of hedging will be removed along the boundary to the west of T1 location to provide a buffer for bats (see **Section 6.5.5.1**). This is a low hedge dominated by gorse and bramble. At T2 and T3 locations, there is no hedging to be removed for bat buffers. A further 25m of hedgerow will be lost at the site entrance. In total, 265 m of hedgerow habitat will be lost.

Hedgerows will be reinstated where possible (at the site entrance) and where reinstatement is not possible (due to permanent works or around bat buffer zones), replacement on a like-for-like basis within the redlined boundary will occur.

Additional hedgerow habitat will be created to offset the loss following best practice, a minimum of 530 m, i.e. twice the total loss, will be replanted within the redline boundary of the wind farm site.

The new plantings will comprise native hawthorn and willow (*Salix aurita* and/or *Salix cinerea* subsp. *oleifolia*). All plantings will be of certified Irish genetic stock. Planting will be along the boundaries of fields where there is either no existing hedging (usually just a drainage ditch) or where there is an existing hedge that is poorly grown with gaps and may require bolstering. Details of the planting programme are within the Biodiversity Enhancement and Management Plan (see **Appendix 6.11**).

6.5.2.2 Mitigation to minimise disturbance of cutover bog

Inevitably the construction works will cause disturbance to cutover bog habitat around the turbine and hardstand for the T2 turbine and along the access road, as an area will be needed by the Contractor to facilitate the works. To minimise disturbance to the bog and to ensure good recovery, as well as to minimise areas of bare peat which would be prone to erosion, a programme of ongoing monitoring and rehabilitation will be followed during construction phase.

Restricted access to cutover bog

At the commencement of works at the T2 location, the required work footprint on the bog will be identified and the area will be marked by a rope fence (using range poles or similar) and with appropriate signage. No activities will be allowed outside of this agreed work area. The ECoW will inspect the area regularly whilst works are on-going at T2. Excavated peat and other material will be removed to the approved storage area with no storage of spoil or materials on unplanted bog or in areas immediately adjoining the bog. The fence will remain in place until the works are fully complete.

Re-vegetation of bare surfaces

Mitigation is required to minimise the area of exposed peat surface and to encourage revegetation. This will be achieved by removing suitable areas of the vegetated cutover bog surface (cut out as sods or 'turves') within the work footprint at T2 and including the section of access track over the cutover bog. This material will be stored appropriately on-site, and reused to re-instate areas around the turbine, hardstand margins and along the edges of the access tracks. It is noted that wet areas of the bog surface (such as along old drains) and/or undulating areas at old peat banks are unlikely to be suitable for the removal

of peat turves (however, such surfaces will be removed and stored separately from sub-soils for later surface re-instatement works – see **Chapter 2: Section 2.5.17**).

The surface turves of vegetated bog will be dug out to a minimum depth of approximately 30cm using a dumper/digger with a bucket. Care will be taken to keep the turve as intact as possible and the vegetated side upwards (though this is not always possible). The turves will be loaded to a trailer and transported to a pre-identified storage area. The storage area will be located in an area of Site (not vegetated bog) where disturbance during the storage period will not occur. The turves will be off-loaded from the trailer and placed side by side and vegetation side upwards. They will be placed in single layers, *i.e.* not piled on top of each other. Should storage be for prolonged periods (months), the turves may need to be watered during dry spells. When ready for placement at the finished turbine/hardstand/track, they will be lifted with a dumper and bucket and taken to the destination. Here they will be off-loaded, placed side by side on the disturbed bog surface with vegetation side up. The turves will be bedded in with the bucket of a dumper so that they form a continuous layer without gaps between them. This approach will provide almost immediate cover of the bare surfaces and is highly effective in reducing the potential for surface erosion. All of the above will be monitored by the ECoW.

6.5.2.3 Mitigation to minimise disturbance of Molinia meadow

While the encroachment into the Molinia meadow by the construction of turbine T3 is fairly minor (estimated 200 m²), care is required to minimise disturbance to the meadow area adjoining the work area.

As described for cutover bog, at the commencement of works at the T3 location, the required work footprint within the Molinia meadow will be identified and the area will be marked by a rope fence and with appropriate signage. No activities will be allowed outside of this agreed work area. The ECoW will inspect the area regularly whilst works are ongoing at T3. The fence will remain in place until the works are fully complete.

In addition, some of the grass surface will be dug out and stored during the construction phase and later replaced over the disturbed surface around the turbine foundation. This will follow the same procedure as described for the cutover bog, though a smaller amount of sods will be required as only the actual turbine protrudes into the Molinia meadow.

6.5.3 Otter

Otter occurs along the Moyasta River, as well as in Poulmasherry Bay. While the baseline survey (**Section 6.3.4**) did not record any presence of otter in the immediate vicinity of the Site, a pre-construction survey will be carried out along the stretch of river which skirts the project redline boundary, and upstream and downstream of the boundary, should more than 24 months have elapsed since the baseline 2024 survey (NRA 2008). Should an active holt be located in the immediate area of the proposed works, measures may need to be taken to evacuate the animals from the holt to ensure that there is no disturbance to breeding animals.

The mitigation proposed to maintain water quality in the aquatic zones (as detailed in **Chapter 7: Aquatic Ecology, Chapter 9: Hydrology and Hydrogeology**, and summarised in the **CEMP**) will ensure that the food supplies for otters within local watercourses are not affected by contaminants generated by the proposed Development.

6.5.4 Common frog and common lizard

The common frog is widespread on Site, occurring within both wet grassland fields and cutover bog. Areas where construction works are due to commence during the period February to August will be checked by the ECoW for the presence of frog spawn, tadpoles and adult frogs. If present, these will be removed under licence from NPWS and transferred to suitable ponds, drains or wetlands in the vicinity. The licence will be obtained before construction in anticipation that frogs will be encountered.

During the walk-over survey for presence of the common frog, any common lizards observed will be removed from the work area and placed on bog elsewhere within the site.

6.5.5 Bats

6.5.5.1 Construction phase mitigation

6.5.5.1.1 Tree and hedgerow clearance

Some sections of hedgerow (WL1) and coniferous plantation (WD4) removal is required to accommodate the development of the new site access tracks and buffer areas for bats. Also, NatureScot (2021) recommends a minimum 50 m buffer from the blade tip to the nearest key habitat features (e.g. hedgerows) to be implemented to avoid encouraging bat activity within the 'blade-swept' area. These areas will be maintained vegetation-free during the operational life of the development. The clearance area surrounding each individual turbine was calculated using the formula presented below (after NatureScot 2021).

Calculate the distance between the edge of the feature and the centre of the tower (b) using the formula:

$$b = \sqrt{(50 + bh)^2 - (hh - fh)^2}$$

where:

bl = blade length,

hh = hub height,

fh = feature height (all in metres).

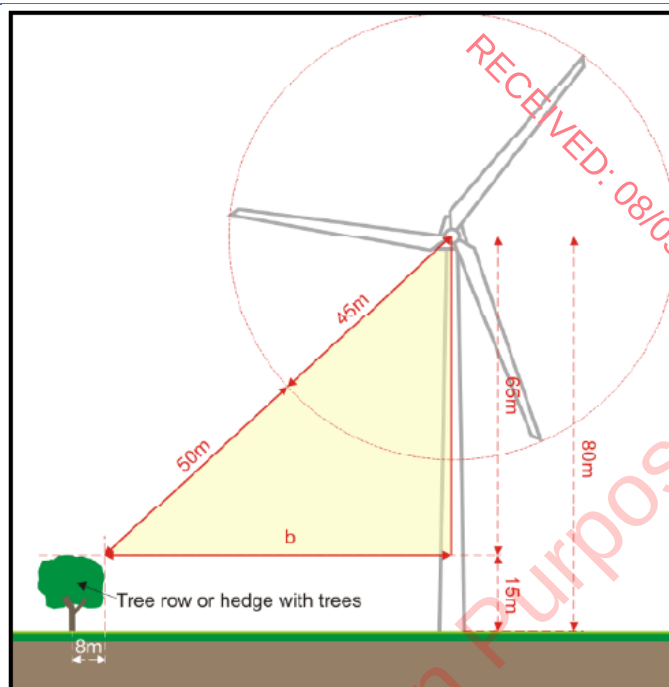


Illustration © Entec Ltd.

For the example shown, $b = 69.3\text{m}$.

Turbine 2 will be located within a cutover bog without significant landscape features and no clearance buffer is required for this turbine. Similarly, Turbine 3 will be located within a grassland field with no significant landscape features, besides a deepened drain with a strip of gorse and bramble along its bank. It is considered that vegetation removal in this instance is not required. The remaining Turbine 1 will be placed within an improved agricultural field, with a low gorse dominated hedge west of the proposed turbine (approx. 2-3 meters high), running north to south, which will be removed to avoid encouraging bat activity in the 'blade-swept' area. No trees of any significant height are present proximal to the proposed locations. For this turbine, a recommended minimum clearance distance of 87.6m from the centre of the tower was calculated.

A comprehensive survey effort was carried out in relation to potential roost features in structures following Collins (2023). Disused structures of 'Low' to 'Moderate' suitability for roosting bats were identified along both grid connection routes assessed and the TDR. No evidence of historic or contemporary roosting was identified at the time of the surveys. Additionally, private residential dwellings are located along the grid connection route and the relevant section of the TDR which were not surveyed internally as part of this assessment. Considering the scale and extent of the proposed facilitation works along the grid connection routes and turbine delivery route, it is not likely that these structures will be

significantly affected by the construction phase impacts and thus no mitigation measures are considered.

Construction operations will take place during the hours of daylight in as far as possible to minimise disturbances to bats and other wildlife. It is recognised that key works such as turbine delivery and erection may require night-time working. Two 17m high lightning monopole protection masts are proposed at the control building and a warning light will be fixed to two of the turbines. Otherwise, motion sensitive lighting only will be used.

6.5.5.2 Operation phase mitigation

A 'High' level of overall collision risk has not been identified for any bat species in any of the bat activity seasons. Based on best available information, a 'Medium' overall collision risk level has been identified in relation to high-collision-risk bat species, across all three activity seasons, with the exception of a 'Low' risk for *Nathusius' pipistrelle* in the autumn period.

In addition to the creation of buffers between the proposed turbines and surrounding vegetation (discussed above), reduced rotation speeds will be implemented at all three turbines when the turbines are idling, this is known as 'feathering' of idling blades. 'Feathering' of idling blades may reduce fatality rates by up to 50% and does not result in loss of output (NatureScot, 2021). No additional control measures to avoid/reduce collision related bat fatalities are considered warranted for this project.

No bat roosts will be lost as a result of the proposed development but as an enhancement measure artificial bat roosting opportunities will be provided locally. There will be 8 no. bat boxes erected at suitable locations, and outside of the clearance buffers, in consultation with a bat-licensed Ecologist. 'Woodcrete' bat boxes will be used as they are durable do not require maintenance. A mixture of bat box types should be used to cater for seasonal and species requirements. The following products (or similar) are suitable:

- Schwegler 1FS Colony Bat Box 95
- Schwegler 2F Universal Bat Box
- Schwegler 2FN Bat Box 55

Bat boxes will be installed on suitably large trees or specially installed poles. Boxes will be installed at a minimum height of 4 meters above ground level, at suitable aspects (not northern) and in locations which are inaccessible to unaided climbing and not vulnerable to artificial light or noise pollution. Monitoring of proposed bat boxes will be carried out by a

bat-licensed Ecologist, and relocation of any boxes with no evidence of use in the first year after construction.

All permanent lighting systems will be designed in accordance with ILP (2023)⁷ in order to minimise nuisance through light spillage. All non-essential lighting will be switched off during the hours of darkness. No artificial lighting will illuminate any trees or structures with potential to be used by roosting bats to prevent disturbance to bats roosting within upon emergence and re-entry. To reduce the ecological disturbance from artificial lighting, the following guidance is recommended:

- Reduce non-essential external night lighting.
- Lower the angle of external night lighting.
- Use of LEDs, as these emit minimal ultra-violet light.
- White and blue wavelengths should be avoided; wavelength will be <2,700 kelvin.
- Lights should peak higher than 550nm.

6.5.5.3 Grid connection route mitigation for bats

No trees of PRF-M suitability were recorded along either grid connection route assessed. Additionally, no tree clearance or tree trimming works are proposed to facilitate the grid connection. Due to the limited and temporary nature of the works proposed, no further surveys or other mitigation measures are considered necessary.

6.5.5.4 Turbine Delivery Route Mitigation for Bats

Enabling works along the proposed turbine delivery route will result in the loss of 0.0845 ha of conifer plantation to facilitate the blade set-down area and approximately 70 m of hedgerow. It is considered that that further survey of trees with a decreasing probability of use by roosting bats including “coniferous plantation with no specimen trees” is not warranted (Marnell et al., 2022). Although no evidence of current or historic roosting by bats was recorded along the TDR at the time of survey, the assessment was based on the design information to date and will be subject to future assessment and application, should a delay of more than 24 months occur between this survey and the proposed works. Surveys will be carried out according to Collins (2023). If required, a derogation license will be secured in advance of any tree-felling works, if any, and appropriate mitigation measures will be put in place to avoid or reduce impacts on bats

⁷ <https://theilp.org.uk/publication/guidance-note-8-bats-and-artificial-lighting/> [Last accessed on: 23/01/2024]

6.5.5.5 Decommissioning phase mitigation for bats

The potential for impacts during decommissioning are similar to those assessed for the Construction Phase. All decommissioning works will be governed by the same requirements to control run-off or potential pollution to watercourses (feeding resources for bats), as have been implemented during the construction phase. The site compound will conform to the construction phase mitigation measures including those related to lighting design.

6.5.6 Birds

6.5.6.1 Mitigation for birds during construction phase

6.5.6.1.1 Mitigation for loss of habitat

This assessment has identified loss of cutover bog habitat (0.8 ha) as an adverse effect of Slight significance for breeding birds (mainly meadow pipit & skylark) and wintering snipe, as well as for foraging species such as hen harrier and kestrel. The loss of cutover bog will be off-set through the provision of a Biodiversity Enhancement and Management Plan (see **Appendix 6.11**). Briefly, this will enhance an area of former cutover bog, now mostly dominated by rushy wet grassland, so that it provides better quality habitat for the above-mentioned species. The former cutover bog identified for enhancement has a total area of 4.04 ha.

6.5.6.1.2 Mitigation to minimise disturbance to sensitive breeding species

While the baseline surveys carried out in the period 2020 to 2024 did not record any of the target species breeding within the Site, pre-construction confirmatory breeding surveys for selected species (see **Section 6.8.5**) are required on the basis of the presence of suitable breeding habitat which could support such species by the time of the commencement of construction works, *i.e.* as several years are likely to pass between the 2020-24 baseline surveys and the start of construction, the local status of some species may well have changed.

Should the pre-construction surveys indicate a requirement for protection from construction-related disturbance of any relevant species, appropriate measures will be taken in line with all relevant legislation and best practice guidance available at the time to ensure that breeding attempts are not disturbed by construction related works.

Best available evidence has been reviewed (Currie & Elliot 1997, NatureScot 2022, Pearce-Higgins *et al.* 2012, Scottish Natural Heritage 2016) and it is suggested that the following relevant species could be disturbed by construction works at the following distances:

Merlin	500 m
Kestrel	200 m
Snipe	400 m
Barn owl	100 m

Should any of these species be recorded breeding within the given distances of the works area through confirmatory surveys before and/or during construction, a buffer zone (using above distances) shall be established around the expected location of the nest (location identified as far as is possible without causing disturbance to the bird) and all works will be restricted within the zone until it can be demonstrated by an ornithologist that the species has completed the breeding cycle in the identified area. Any restricted area that is required to be set up will be marked clearly using hazard tape fencing and all site staff will be alerted through toolbox talks.

The above mitigation, if needed, will apply from March to August (inclusive) and will ensure that the works will not have an adverse effect on the identified species of conservation importance.

6.5.6.1.3 Mitigation to minimise disturbance to nesting birds

A range of passerine bird species breed within the Site, including the Red-listed meadow pipit and Amber-listed species such as skylark and willow warbler. In compliance with Section 22 of the Wildlife Acts 1976 to 2022, all vegetation required to be cleared to facilitate the works will be done outside of the restricted period from 1st March to 30th August.

Should it be necessary to remove vegetation during the breeding season, for instance where bramble and ephemeral plant species have become established on ground cleared earlier, this will be surveyed by an ornithologist up to 10 days before any clearance. Should an active nest be located, the area will be restricted from works by a distance where it is considered that the works would not cause disturbance or abandonment of the nest. Such distances, which will vary according to species and local topography, will be determined by the ornithologist. The restriction will be maintained until it is established that any young birds present have fledged.

6.5.6.2 Mitigation for birds during decommissioning phase

As the Decommissioning works will involve works similar to those involved at construction stage (albeit at a lower intensity), these could result in similar effects on birds. Hence, the mitigation that will be undertaken for minimising disturbance to nesting birds during

construction will also be applied during the decommissioning phase (taking into account changes that may have occurred locally during the operational life of the Project).

6.5.7 Invasive Species

While a stand of Japanese knotweed occurs within the Brisla East Stream along the Turbine Delivery Route, impacts on this population of the Third Schedule invasive species as a result of the proposed development are not likely (see **Section 6.4.9**).

Nevertheless, best practice measures will be taken throughout the construction phase to prevent the introduction or spread of invasive alien species. The commencement of works will be preceded by a confirmatory survey for invasive plant species.

During construction, the following best practice measures will be implemented:

- Good construction site hygiene will be employed to prevent introduction of invasive plant species by thoroughly washing vehicles prior to entering site
- Any soil or topsoil required on the site will be sourced only from a stock that has been screened for the presence of invasive species
- Should the presence of an invasive species be detected, the treatment and control of same will follow guidelines issued by the National Roads Authority - The Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads (NRA 2010).

Implementation of the above measures will ensure that there will be no significant effect with regard to Third Schedule invasive species as a result of the proposed development.

6.6 RESIDUAL EFFECTS OF THE DEVELOPMENT

The strict mitigation measures which will be enforced to maintain water quality in local drains and watercourses during the construction, operational and decommissioning phases of the Project, all of which are proven best practice techniques in common practice on construction sites, will ensure that there will be no significant residual effects (rated as Imperceptible or Not Significant) on water quality or aquatic habitats or species. As potential effects on designated sites (both European and National) as a result of the Project would potentially arise from contaminants carried within watercourses, it follows that there will be no significant effects on identified designated sites with hydrological connectivity with the Site (namely the Lower River Shannon SAC & the River Shannon and River Fergus Estuaries SPA).

The design of the Project has ensured that there will be no adverse effects, either direct or indirect, on the remnant area of uncut raised bog within the study area during any phase of the Project. While the project will result in the loss of an estimated 0.8 ha of cutover raised bog, an effect rated as Significant, the implementation of the Biodiversity Enhancement and Management Plan will off-set this loss and result in the enhancement over time of an area of up to 4.04 ha of cutover bog that has been largely converted to wet grassland dominated by rushes – this will reduce the effect to Not Significant or, at most, of Slight Significance in the medium-term (7-15 years) and a likely net Positive effect in the long-term (>15 years).

The minor loss (c.200 m²) of Molinia meadow will be off-set by the implementation of the Biodiversity Enhancement and Management Plan, which will provide sensitive management for the remainder of the Molinia meadow within the site, including the provision of suitable habitat conditions for the Annex II listed marsh fritillary. The Slight negative effect by the loss of habitat will be reduced to Not Significant and ultimately to a likely net Positive Significant effect in the medium-term (7-15 years).

With mitigation measures as presented implemented in full, including preservation of water quality in local watercourses for otter, it is considered that there will be no significant adverse residual effects on terrestrial mammal species, amphibians or reptiles as a result of the proposed Project.

The mitigation measures, as described for the Project, have been designed to minimise the impact of the development on the local bat populations. The assessment has found that the proposed development in the absence of mitigation will have a 'Slight' permanent negative effect on bats at a local level during both the construction and operational phases (EPA, 2022). The proposed mitigation measures are expected to avoid or significantly reduce the likelihood of any significant impacts occurring on bats as a result of the construction and operation of the proposed wind farm. Ongoing monitoring and implementation of the mitigation measures will ensure the preservation and future stability of the surrounding foraging and commuting habitats for bats. With the implementation of the mitigation measures outlined in this assessment it is concluded that the development will have a 'imperceptible' permanent negative residual effect on the bat population at a local level.

For birds, the predicted effects by loss of cutover bog habitat will be reduced to Not Significant with the implementation of the Biodiversity and Enhancement Management Plan and, in the long-term, potentially a Positive effect as a larger area of cutover bog will be

available for important species such as breeding meadow pipit and hunting hen harrier and kestrel.

The presence of the turbines is unlikely to cause a significant displacement effect for most bird species, though hen harrier and buzzard are identified as species which may avoid the areas around the turbines. While habituation to the presence of the turbines is likely with time, the significance of the residual effect for these species is rated as a Slight short- to medium-term effect.

For most bird species, the risk of collision with rotating turbines was shown to be Imperceptible or Not Significant. Kestrel showed the highest risk of collision, with the significance of the effect rated as a Moderate long-term adverse effect at a local level. While the risk to hen harrier is low, the significance of the effect is rated as a Slight long-term adverse effect at a national level (reflecting the conservation status and declining national population of the species).

The Project is not likely to have any adverse residual effects on bird populations in the hinterland of the site, including the important wetland populations associated with Poulnasherry Bay and the Shannon estuary.

6.7 BIODIVERSITY ENHANCEMENT

The Biodiversity and Enhancement Management Plan is presented in **Appendix 6.11**. The Plan has three objectives, as follows:

- To enhance an area (4.04 ha) of cutover bog that has been used for grazing and is largely dominated by rushes. This will offset the loss of a relatively small area of cutover (c.0.8 ha) as a result of the Proposed Development. By including a large area of bog within the Plan compared to the relatively small loss as a result of the Proposed Development, the Plan recognises and highlights the importance of this habitat.
- To manage sensitively an area of Annex I listed Molinia meadow (1.78 ha), of which a small part (c.200m²) is being affected by the Proposed Development. The meadow, which has been somewhat degraded though over-grazing, will be managed with a particular focus on providing suitable habitat for the marsh fritillary.
- To offset the loss of hedgerows as a result of the Proposed Development by a hedgerow replanting programme within the Site.

It is likely that with the implementation of the BEMP, the overall ecological value of the Site will increase over time, with benefits not just for habitats and marsh fringing, but also birds, mammals and invertebrates.

6.8 PRE-CONSTRUCTION AND CONSTRUCTION PHASE MONITORING

6.8.1 Pre-construction bat surveys

Pre-construction surveys will be carried out by an experienced bat ecologist immediately prior to the commencement of any required vegetation clearance to establish if the baseline conditions reported herein remain valid, given the potential for delays between reporting and the commencement of construction. This will ensure that any changes in site context in relation to suitability for bats will be highlighted and that any additional mitigation measures which are then required are applied.

6.8.2 Pre-construction badger survey

While there was no evidence of badger presence during the baseline surveys in 2023 and 2024, if three years lapse from between the planning-stage surveys and the installation of the wind turbines, it will be necessary to carry out a pre-construction survey for badger as the local distribution may have changed in that period. Such a survey would be carried out by an ecologist with experience with badgers and would focus on a 100 m minimum distance of the wind farm infrastructure. Should a badger sett be located within a distance of 50 m of a work area, mitigation may be required involving the closure of the sett (in consultation with NPWS) or the enforcement of a restrictive zone to prevent disturbance to underground tunnels. The surveyor would advise on the appropriate mitigation taking into account the type of sett (i.e. main, secondary, outlier) and the proximity of the works.

6.8.3 Pre-construction otter survey

While otter was not recorded along the section of the Moyasta River which passes alongside the site for the proposed Development, and including the Grid Connection cable route crossing, if three years lapse from between the planning-stage surveys in 2023 and 2024 and the commencement of works on site, it will be necessary to carry out a pre-construction survey for otter along the Moyasta River as the local distribution of otter may have changed in that period.

It is noted that the three watercourses crossed along the L6132 section of the TDR are not suitable for supporting otter.

6.8.4 Pre-construction bird survey

Pre-construction confirmatory breeding surveys will take place within suitable habitat for the following species:

- Merlin
- Kestrel
- Snipe
- Barn owl

The purpose of the surveys is to establish if breeding is occurring at the time, which could be affected by disturbance during the construction phase. The surveys will take place to a distance of at up to 500 m from the Development area.

Surveys will be carried out by an experienced ornithologist following standard methods. Following on from the surveys, guidance will be provided, if considered necessary, to the contractor on where restrictive zones are required during the bird nesting season.

6.8.5 Pre-construction survey for invasive plant species

As noted in **Section 6.5.7**, a survey for the presence of Third Schedule listed invasive species will be undertaken prior to the commencement of any works.

This will be carried out during the main growing season (April-September) and will focus particularly on Japanese knotweed and *Gunnera* spp., species known to be in the study area and widespread in County Clare.

6.8.6 On-going monitoring during construction

An Ecological Clerk of Works (ECoW) will be on site for the duration of the construction phase to ensure that all mitigation measures described herein are implemented. In particular, the ECoW will monitor on a continual basis the works within the cutover bog at turbine T2 and within the Molinia meadow fields where T3 is located.

6.9 POST-CONSTRUCTION MONITORING

6.9.1 Habitats

Post-construction monitoring will focus on the cutover bog which had been disturbed by construction of T2 turbine (the Molinia meadow will be monitored through the BEMP programme).

When all ground works are complete at the T2 location, a vegetation survey will take place by an ecologist. This will describe the state of the vegetation in the disturbed area and for a distance of up to 50 m beyond that where drying effects may occur as a result of the disturbance from construction works. A series of monitoring quadrats will be established to accurately describe the vegetation, including bare areas, at the time (Year 1) and in subsequent years. Details will be worked out by the ecologist, but it is likely that quadrats will be 2 m x 2 m in size for the cutover bog and will be geo-referenced and photographed. As disturbance will be limited to one area of bog, it is expected that the number of quadrats would not exceed 10.

Vegetation recovery in the cutover bog area will be monitored over a period as follows: Years 1, 2, 3, 5, 10, 15, 20 and 25. Reports will be prepared for each year of monitoring and issued to Clare County Council.

6.9.2 Bat monitoring

NatureScot (2021) recommends post construction monitoring is carried out in at least three years post construction, but not necessarily consecutive years. Post-construction monitoring aims to assess changes in bat activity patterns (e.g. in response to landscape changes such as land management and forestry rotation) and the efficacy of mitigation to inform any changes which may be required to curtailment strategy. Post-construction fatality monitoring and activity surveys will be carried out in years 1, 2, 3, 5 and 10 post-construction. Post-construction monitoring will consist of:

- Passive bat monitoring at all turbine locations in order to monitor changes in activity levels relative to pre-construction baseline information (presented herein).
- Fatality monitoring following the methodology presented in Appendix 4 of NatureScot (2021) or subsequent updates.

Post-construction monitoring data will be analysed and presented in report format to the planning authority. Recommendations will be made in relation to curtailment strategy if required.

6.9.3 Post-construction bird monitoring

Post-construction bird monitoring will take place to establish whether the construction and operation of the proposed Development has had effects on the bird species associated with the Site prior to construction (as shown by the baseline surveys in the 2020-2024 period). The monitoring programme will comprise the following:

Flight activity surveys

Flight activity surveys will be undertaken using the Vantage Point method (Scottish Natural Heritage 2017). The purpose of the surveys is to determine if the presence of the turbines is causing species such as hen harrier and kestrel to avoid the Site. This will use the same Vantage Points as used for the baseline EIAR surveys so that a valid comparison can be made between the two periods. The surveys will be undertaken monthly in Years 1, 2, 3, 5, 10 and 15 of the lifetime of the project (in accordance with Scottish Natural Heritage Guidance 2009).

Collision searches

The objective of collision monitoring and corpse search is to establish whether bird fatalities are occurring as a result of collision with turbine blades.

Carcass search was traditionally completed by human observers whose efficiency is influenced by several factors including carcass type, environmental conditions and observer competence. Numerous studies have been conducted demonstrating that dogs have a superior ability to detect bird and bat carcasses than humans, particularly with small carcasses or in dense vegetation. A trained dog under the control of a handler will be used. The post-construction monitoring will be carried out in Years 1, 2, 3, 5 and 10

Note: A combined monitoring programme will be undertaken to detect both bat and bird carcasses, *i.e.* both bats and birds will be monitored during the same site visits/surveys. However, specific surveys for birds will be required in the winter period as well (when bat surveys are not required).

6.10 SUMMARY OF SIGNIFICANT EFFECTS

With the implementation of mitigation through avoidance principles, pollution control measures, surface water drainage measures and other preventative measures which have been incorporated into the project design in order to minimise potential significant adverse impacts on water quality and biodiversity at the Site, the potential for adverse impacts on downstream designated sites is reduced to Not Significant.

From the perspective of terrestrial habitats, the principal significant effect as a result of the proposed Project is the loss of 0.8 ha of cutover raised bog habitat and of 200 m² of partly degraded Molinia meadow. However, with the successful implementation of the BEMP (Appendix 6.11), there will ultimately be a net increase in the area of cutover bog at the Site, which is rated as a Likely Positive Effect in the long-term. The BEMP will also improve the

quality of the remainder of the Molinia meadow on site, with particular focus on creating conditions suitable for the Annex II listed marsh fritillary.

As well as loss of cutover bog habitat at the turbine T2 location there will be disturbance to the surrounding cutover bog from construction works. However, with mitigation and biodiversity enhancement measures implemented in full, it is considered that the significance of the disturbance effect can be reduced to a Slight Short-term Adverse Effect.

With mitigation measures implemented in full, including preservation of water quality in local watercourses used by otter, it is considered that there will be no significant adverse residual effects on terrestrial mammal species, amphibians or reptiles as a result of the proposed Project.

With the implementation of the mitigation measures outlined in this assessment it is concluded that the development will have a 'imperceptible' permanent negative residual effect on the bat population at a local level.

For birds, the predicted adverse effects of the Project with mitigation in place are reduced to the level of Slight, or at most Moderate (in case of collision risk to kestrel), of Short- to Medium-term duration. All are at a local level of importance, other than a Slight effect on hen harrier (from collision risk), which is considered at the national level of importance.

The proposed Project is not likely to have any adverse residual effects on bird populations in the hinterland of the site, including the important wetland populations associated with Poulmasherry Bay and the Shannon estuary.

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