

7.0 BIODIVERSITY

7.1 INTRODUCTION

This chapter presents an impact assessment of the likely effects of the proposed Oweninny Wind Farm Phase 3 development¹, as described in Chapter 3 (Description of the Proposed Development) on biodiversity, with the exception of avifauna, which are covered in Chapter 8 - Ornithology. Details of the assessment methodology and existing site conditions are presented, potential impacts are assessed, and mitigation measures are recommended, where required.

The objectives of the ecological evaluation included:

- To obtain baseline ecological data at the proposed development site;
- To determine the ecological value of the identified ecological receptors;
- To assess the potential impacts, including direct, indirect, secondary and cumulative impacts which may result from the proposed works during construction, operation and decommissioning;
- To recommend mitigation measures to avoid and/or reduce impacts; and
- To identify any residual impacts post mitigation and enhancement measures.

The potential impacts of the proposed development on European sites (sites designated as Special Areas of Conservation [SACs] or Special Protection Areas [SPAs] that form part of the Natura 2000 network) in the Zone of Influence (ZoI) have been evaluated. This appraisal is presented separately in the form of a Natura Impact Statement (NIS) (which accompanies the Planning Application documentation as a standalone document).

The proposed development will be located on the eastern part of Oweninny Bog, which is located in North Mayo, approximately 12km west of Crossmolina and 15km east of Bangor Erris, and just north of the N59 National Primary Road. The overall area of Oweninny Bog is approximately 5,090 hectares, while the site area of the proposed development is approximately 2,345 hectares. A number of watercourses occur within the proposed development site boundary. The Oweninny River (Waterbody Code: IE_WE_33O040050) flows to the west of the proposed development site and the Owenmore River (Waterbody Code: IE_WE_33M010100) flows through the south west corner of the site. The Cloonaghmore river (Waterbody Code: IE_WE_34C030100) crosses the north of the proposed development site and the Shanvolahan river (Waterbody Code: IE_WE_34S010400) flows through the south east of the proposed development site. Lough Dahybaun (Waterbody Code: IE_WE_34C030100) is also found within the proposed development site.

¹ Note: The proposed development refers to all elements of the project which includes; the proposed wind farm site, the proposed grid connection and the works areas associated with the turbine delivery route.

It is proposed that 18 no. wind turbines will be located across the proposed development site. This chapter has considered detailed information available from previous studies in the area and other data sources for this landholding, including habitat data and protected fauna (see Section 7.7).

Full details of the proposed development are provided in Chapter 3 (Description of the Proposed Development) of this Environmental Impact Assessment Report (EIAR).

7.2 STATEMENT OF AUTHORITY

This biodiversity chapter has been completed by John Sherry (B.Sc.) Project Ecologist with TOBIN Consulting Engineers (TOBIN) in conjunction with Áine Sands, Senior Ecologist in TOBIN In addition to the TOBIN Ecology Team, Dr Tina Aughney of Bat Eco Services, (licenced bat specialists) carried out a detailed bat surveys and wrote a bat report of her findings. Lastly, John Browne of Stillwaters Consultancy (electrofishing specialist) carried out a detailed electrofishing survey within the proposed development site and provided a report of his findings.

John Sherry

John Sherry (B.Sc.) is a qualified Project Ecologist with TOBIN and has over three years post-graduate experience in ecology and environmental consultancy. John has mainly been involved in the surveying and reporting of large-scale renewable infrastructure projects where he has carried out Appropriate Assessment Screening reports, Natura Impact Statements, Environmental Impact Assessment Reports and Ecological Management Plans. John has a proven knowledge of field skills and has been involved with the planning and implantation of a variety of surveys including habitat surveys, non-volant mammal surveys and bat assessments. However, he has mainly been focused on ornithological surveys involving winter and breeding bird surveys associated largely with proposed wind farms or infrastructure developments.

Áine Sands

Áine (B.Sc.) is a qualified Senior Ecologist with TOBIN and has seven years post-graduate experience in ecology and environmental consultancy. Áine has predominantly been involved in large public and private renewable infrastructure projects where she has carried out numerous Screenings for Appropriate Assessments, Natura Impact Statements and Ecological Impact Assessments for proposed developments. Áine has a strong understanding of National and European legislation associated with biodiversity and is cognisant of relevant rulings by the

Court of Justice of the European Union (CJEU) associated with Appropriate Assessment. Áine also has experience with undertaking ecology surveys for protected habitats and species.

Dr Tina Aughney (Bat Eco Services)

Dr Aughney has worked as a Bat Specialist since 2000 and has undertaken extensive survey work for all Irish bat species including large scale development projects, road schemes, residential developments, wind farm developments and smaller projects in relation to building renovation or habitat enhancement. She is a monitoring co-ordinator and trainer for Bat Conservation Ireland. She is a co-author of the 2014 publication *Irish Bats in the 21st Century*. This book received the 2015 CIEEM award for Information Sharing. Dr Aughney is a contributing author for the Atlas of Mammals in Ireland 2010-2015.

John Browne (Stillwaters Consultancy)

John Browne (M.Sc.) is the director of Stillwater Consultancy, with over 20 years' experience. He has undertaken projects for State Companies which include the Electrical Supply Board (ESB), Bord Iascaigh Mara (BIM) and the Marine Institute along with many private companies, contractors and consulting engineers. John has extensive experience with undertaking electro-fishing surveys, including, carrying out and supervision of electro-fishing surveys for the diversion and re-establishment of two streams. Carrying out electro-fishing surveys for over ten years on streams draining a major refuse site in East Galway for license compliance. John has supervised major catchment wide electrofishing surveys on the Rivers Moy, Boyne and Corrib and has carried out electro-fishing surveys for many windfarm developments. He also has experience as an expert witness in fishery and water quality inquiries and court cases.

7.3 PHASES OF THE DEVELOPMENT

The key phases of the proposed development for the purposes of evaluation of ecological impacts are the construction, operational and decommissioning phases. The entire project as detailed in Chapter 3 (Description of the Proposed Development) of this EIAR has been assessed throughout this chapter.

7.3.1 Construction Phase

The following are key activities that will be undertaken during the construction phase and could potentially cause significant effects on the environment. They therefore need to be given particular consideration in the evaluation of ecological impacts:

- Site clearance and any drainage requirements at turbine locations and substation location to facilitate construction;
- Construction of the proposed development and associated infrastructure including; access tracks/routes, temporary compounds, turbine hardstanding, onsite substation, underground grid connection, bridges, culverts and temporary construction works associated with the turbine delivery route.
- The use of heavy machinery and associated disturbance within the 'works area' during construction;
- The excavation of soils/peat for the installation of turbines, substation base and associated hard standing areas and any associated drainage requirements;
- The use of concrete and other potentially harmful substances at each works area; and
- Management, storage and reuse of excavated material during the construction phase.

7.3.2 Operation Phase

The operation phase of the development will include the following key activities, which could potentially cause significant effects on the environment, and will therefore need to be considered in the evaluation of ecological impacts:

- Rotating blades of operating turbines within the wind farm envelope; and
- Maintenance of turbines and site infrastructure throughout the lifetime of the proposed development.

7.3.3 Decommissioning Phase

The decommissioning phase of the development will include the following key activities, that could potentially cause significant effects on the environment, and will therefore need to be given particular consideration in the evaluation of ecological impacts:

- The activity of decommissioning machinery and associated personnel may result in disturbance impacts for local wildlife; and
- Decommissioning activities could potentially result in the release of sediment-laden water or pollutants into local watercourses.

7.4 STUDY AREA

As discussed in Chapter 3 (Description of the Proposed Development) of this EIAR, the proposed development includes an 18 no. turbine wind farm in County Mayo and all associated infrastructure. The study area for this Biodiversity Assessment comprised the proposed wind farm site and the wider surrounding hinterland. The area along the proposed grid connection route and the works areas associated with the turbine delivery route (TDR) are also included in this study area.

7.5 ZONE OF INFLUENCE

The Zol is the likely area over which the proposed development could have potential impacts on a given receptor. The Zol was first assessed through a desk study review of ecological information that was pertinent to the proposed development, focusing on a 15km buffer around the proposed development. The Zol over which significant impacts may occur will differ for different key ecological receptors (KERs), depending on the pathway. Significant impacts are deemed to be those impacts resulting in a likely change in conservation status of a KERs. According to the National Roads Authority (NRA) guidelines (NRA 2009²), KERs will be features of sufficient value to be material in the decision-making process for which potential impacts are likely. According to the NRA Guidelines, KERs are therefore defined as features of Local (Higher Value), County, National, or International Importance.

The first step in determining the Zol is to analyse the characteristics of the proposed development and identify the range of the Zol using the source-pathway-receptor conceptual model. The mechanism for defining the Zol is summarised as follows:

- The nature, size and location of the proposed development were considered;
- The sensitivities of the relevant ecological receptors were considered; and
- The potential impact sources and pathways were identified.

The Zol for the various ecological receptors for which the proposed development could have potential impacts are outlined Table 7-1 below.

² National Roads Authority (NRA; now known as Transport Infrastructure Ireland) (2009). Guidelines for Assessment of Ecological Impacts of National Road Schemes. Available from <https://www.tii.ie/technical-services/environment/planning/Guidelines-for-Assessment-of-Ecological-Impacts-of-National-Road-Schemes.pdf>

Table 7-1: Zone of Influence Informing the Assessment

Ecological Feature		Potential Source(s) of Impact from Proposed Development	Potential Effect	ZoI (metres from proposed development site)	Rationale
Internationally Designated Sites (European Sites)		Vegetation clearance, earthworks and instream works	Habitat loss and/or habitat degradation, disturbance injury/mortality	Individually assessed using the Source-Pathway-Receptor Model ³ .	The Source-Pathway-Receptor model is a standard tool in environmental assessment, which allows the identification of impacts (the source), potential pathways (hydrological, physical, or ecological) and receptors (qualifying interests and/or special conservation interests) which may be negatively impacted ³ . In order for an effect to occur, all three elements of this mechanism must be in place.
Nationally Designated Sites		Vegetation clearance, earthworks and instream works	Habitat loss and/or habitat degradation, disturbance injury/mortality	Individually assessed using the Source-Pathway-Receptor Model ³ .	The Source-Pathway-Receptor model is a standard tool in environmental assessment, which allows the identification of impacts (the source), potential pathways (hydrological, physical, or ecological) and receptors (qualifying interests and/or special conservation interests) which may be negatively impacted ³ . In order for an effect to occur, all three elements of this mechanism must be in place.
Habitats and Flora	Terrestrial habitats or plant species	Vegetation clearance at infrastructure sites and access routes	Habitat loss	0m (i.e. within proposed development site)	Habitat loss in the footprint of the proposed development could pose a risk of significant effect. No vegetation clearance will occur outside the limits of the proposed development site boundary.
	Surface water dependent habitats or plant species	Instream/riparian zone works	Habitat loss and/or habitat degradation	Within the proposed development site and the receiving waters	Habitat degradation effects as a result of hydrological impacts associated with the runoff of environmental pollution/sediment

³ Office of the Planning Regulator (OPR) (2021). Appropriate Assessment Screening for Development Management. OPR Practice Note PN01

Ecological Feature		Potential Source(s) of Impact from Proposed Development	Potential Effect	Zol (metres from proposed development site)	Rationale
				downstream of the proposed works	from nearby construction works could have a significant effect on receiving waters located downstream of the proposed development. The distance downstream is site-specific and will depend on, for example, the volume and type of discharge.
	Ground-water dependent habitats/species	Earthworks and piling at infrastructure sites and access routes	Interference with groundwater supply or quality	Within 100m of groundwater interference	The potential Zol of the proposed development with respect to hydrogeological impact pathways has been defined based upon detailed hydrogeological investigations and advice of the design team's hydrogeologists.
Mammals	Mammal crossing points	Earthworks at infrastructure sites and access routes	Altered or decreased routes for commuting	Within the proposed development site and 150m upstream and downstream of watercourses from the proposed works	Radius within which surveys recommended to detect otter crossing points in the UK Design Manual for Roads and Bridges (Highways Agency 2001 ⁴).
	Breeding or resting sites	Vegetation clearance, earthworks, instream works	Habitat loss	0m (i.e. within proposed development site)	Habitat loss in footprint of the proposed development could pose a risk of significant effect.
			Disturbance to breeding sites	150m	Human presence effects to otter assessed within 150m in accordance with guidance on road construction-related disturbance of underground sites from the National Roads Authority (NRA 2006 ⁵).

⁴ Highways Agency (2001). BD 21/01 – Design Manual for Roads and Bridges Volume 3, Section 4, Part 3 – The Assessment of Highway Bridges and Structures.

⁵ National Roads Authority (NRA; now known as Transport Infrastructure Ireland) (2006). Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes. National Roads Authority: Ireland. Available from <http://www.tii.ie/tii-library/environment/construction-guidelines/Guidelines-for-the-Treatment-of-Otters-prior-to-the-Construction-of-National-Road-Schemes.pdf>.

Ecological Feature		Potential Source(s) of Impact from Proposed Development	Potential Effect	ZoI (metres from proposed development site)	Rationale
	Small and/or less mobile mammal species	Vegetation clearance, earthworks, instream works	Injury or mortality	0m (i.e. within proposed development site)	Vegetation clearance and earthworks within the footprint of the proposed development could cause injury or mortality to small or less mobile mammal species which could pose a risk of significant effect.
Invertebrates	Butterflies, dragonflies, damselflies, beetles, bees, etc.	Vegetation clearance	Direct injury/mortality or loss of habitat	0m (i.e. within proposed development site)	Vegetation clearance within the proposed development could pose a risk of significant effects on invertebrates through direct injury/mortality, or habitat loss.
Aquatic Species	Instream freshwater flora and fauna	Instream/riparian zone works	Habitat loss and injury/mortality	0m (i.e. within proposed development site)	Habitat loss or mortality impacts may only occur within the footprint of the works.
			Habitat degradation	Receiving waters downstream of the proposed works	Habitat degradation effects as a result of hydrological impacts associated with instream/riparian works could have an effect on receiving waters downstream of the proposed works which could have an indirect significant effect on freshwater flora and fauna. The distance downstream is site-specific and will depend on, for example, the volume and type of discharge.

7.6 METHODOLOGY

The ecological appraisal included three main elements to inform the baseline ecological assessment. These included consultation with key stakeholders (Section 7.6.2), a desktop ecological evaluation (Section 7.6.3), and field surveys (Section 7.6.5). The approach and methodology followed have regard to the guidance documents listed in Section 7.6.1.

7.6.1 Legislation, Policies and Guidance

The following legislation, plans and policies have been considered in this chapter, where relevant:

- European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011), as amended. With particular reference to the Third Schedule of the European Communities Regulations 2011 (S.I. No. 477 of 2011) which deals with invasive species;
- The EIA Directive 2011/92/EU, as amended by Directive 2014/52/EU;
- European Union (EU) (Environmental Impact Assessment and Habitats) (No. 2) Regulations 2015 (S.I. No. 320/2015);
- Environmental Liabilities Directive (2004/35/EC);
- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, herein referred to as the Habitats Directive;
- Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds, herein referred to as the Birds Directive;
- The EU Water Framework Directive (2000/60/EC);
- The Wildlife Acts 1976 to 2020 (as amended), herein referred to as the Wildlife Acts;
- The Flora (Protection) Order 2015 (S.I. No. 235 of 2022);
- Relevant fisheries legislation up to and including the Inland Fisheries Acts 1959-2017, as amended;
- Objectives relevant to ecology and biodiversity in the latest County Development Plans of the relevant counties potentially impacted by the proposed development, specifically County Mayo (2022-2028), County Sligo (2017-2023), County Donegal (2018-2024) and County Galway (2022-2028);
- Relevant policies in Actions for Biodiversity 2011-2016, Ireland's 2nd National Biodiversity Plan produced by the Department of Arts, Heritage and the Gaeltacht in 2011 (now the Department of Culture, Heritage and the Gaeltacht);
- Ireland 3rd National Biodiversity Action Plan, 2017-2021 produced by the Department of Culture, Heritage and the Gaeltacht⁶;
- European Commission (2013). Interpretation Manual of European Habitats. Eur 28. April 2013; and
- Climate Action Plan (CAP) 2023 produced by the Department of the Environment, Climate and Communications in 2023

The potential for effects on nature conservation interests was assessed, taking into consideration the habitats and species that are likely to be affected by the proposed

⁶ Ireland's 4th National Biodiversity Action Plan has been underway since October 2021 with the public consultation being carried out last year. This plan will set the agenda for 2023-2027 and will aim to deliver transformative changes required to the ways in which we value and protect nature. Cognisance was made to the objectives outlines within the Draft for Public Consultation.

development. This approach included consideration (as appropriate) of the following guidance documents:

- Fossitt (2000). A Guide to Habitats in Ireland. The Heritage Council;
- EPA (2022). Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.;
- Chartered Institute of Ecology and Environmental Management (CIEEM) (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester;
- National Roads Authority (NRA) (2005a). Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes;
- NRA (2005b). Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes;
- NRA (2006a). Guidelines for Assessment of Ecological Impacts of National Road Schemes (Revision 1, National Roads Authority);
- NRA (2006b). Guidelines for the Treatment of Otters prior to the Construction of National Roads Schemes. National Roads Authority, Dublin;
- NRA (2009a). Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- NRA (2009b). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes;
- NRA (2009c). Guidelines for Assessment of Ecological Impacts of National Road Schemes. (Revision 2, National Roads Authority);
- Smith, G. F., O'Donoghue, P., O'Hora, K., & Delaney, E. (2011). Best Practice Guidance for Habitat Survey and Mapping. Ireland's Heritage Council: Kilkenny, Ireland;
- NRA (2010). Guidelines on the Management of Noxious Weeds and Non-Native Plant Species on National Roads;
- Murray A. (2003). Draft Methodology for a National Hedgerow Survey. Unpublished document for Network for Nature;
- Fitter, R., & Fitter, A. (1984). Collins Guide to the Grasses, Sedges, Rushes and Ferns of Britain and Northern Europe. William Collins Sons & Co. Ltd;
- Parnell, J., Curtis, T., & Cullen, E. (2012). Webbs An Irish Flora. Cork University Press;
- Hayden, T. J., & Harrington, R. (2000). Exploring Irish Mammals. Town House;
- Mc Guinness, S., Muldoon, C., Tierney, N., Cummins, S., Murray, A., Egan, S. & Crowe, O. (2015). Bird Sensitivity Mapping for Wind Energy Developments and Associated Infrastructure in the Republic of Ireland;
- Bang, P., Dahlstrøm, P., & Walters, M. (2001). Animal Tracks and Signs. Oxford university press;
- Sterry P., Cleave A. & Read R. (2016). British Butterflies and Moths (Collins Complete Guides); and
- Dijkstra K.D.B. & Lewington R. (2006). Field Guide to the Dragonflies of Britain and Europe. Bloomsbury Publishing.

7.6.2 Consultation

Consultation with various state agencies and environmental Non-Governmental Organisations (NGO's) was undertaken between February and April 2021 to inform the EIAR. All project consultation is detailed in Chapter 1 (Introduction) of the EIAR. Consultees were informed of

updates to the site layout, as appropriate. Consultation letters were sent (February 2021) to the following key parties relevant to this chapter:

- An Bord Pleanála;
- Mayo County Council;
- Department of Agriculture, Food and Marine
- Development Applications Unit (DAU) and National Parks and Wildlife Service (NPWS);
- Environmental Protection Agency (EPA)
- An Taisce;
- Birdwatch Ireland;
- Irish Raptor Study Group;
- Irish Wildlife Trust;
- Bat Conservation Ireland;
- Irish Red Grouse Association Conservation Trust
- Irish Peatland Conservation Council
- Inland Fisheries Ireland

Table 7-2 below details the responses received in relation to Biodiversity from the above consultees. Additional information on consultation responses is provided in Chapter 1 (Introduction) of this EIAR .

Table 7-2: Summarises of the Key Consultee Responses

Consultation Response	EIAR Section
<p>Department of Culture, Heritage and the Gaeltacht (Development Applications Unit [DAU])</p> <p>A detailed letter received from the DAU highlighted:</p> <ul style="list-style-type: none"> • The need to follow Guidelines of the European Commission’s (2017) ‘Environmental Impact Assessment: Guidance on the preparation of the Environmental Impact Assessment Report; • The concerns of landslide risks resulting from constructing of the proposed development; • The need for the EIAR to outline how this project will avoid a net loss of biodiversity; • Concern of impacts of tree felling on wildlife and habitats; • Concern for the impacts of grid connections and birds and sensitive habitats • The need for all loss of habitat to be mitigated for, with special concern for Annex 1 habitats, NHAs, SACs and SPAs; • The relevant organisations that should be consulted; 	<p>All biodiversity considerations raised by the DAU have been noted by TOBIN:</p> <ul style="list-style-type: none"> • Literature from the relevant environmental organisations, including guidelines from the European Commission and the EPA, have been referred to while writing this EIAR; • Extensive desktop and field survey has been carried out to avoid the likelihood of a landslide and resulting harm to biodiversity, relevant literature has also been accessed on the matter; • No net loss within habitats is addressed in the EIAR and will be achieved by the re-planting of cleared vegetation (as outlined in Section 7.8 Potential Effects); • Concern for the impacts of grid connections on birds will be addressed in Chapter 8 Ornithology; • TOBIN has directly consulted relevant consultees for example the IFI, and has received project specific guidelines to mitigate negative impacts on biodiversity; • Special attention will be given to all protected flora, fauna and habitats and invasive flora and fauna with both field surveying and desktop studies carried out by competent ecologists.

Consultation Response	EIAR Section
<ul style="list-style-type: none"> Surveys need to be carried out by suitable persons at an appropriate time of the year <p>The DAU also noted the special consideration needed to be taken for:</p> <ul style="list-style-type: none"> Birds Bats Bryophytes- Flora Protection Order Species Watercourses and Wetlands Freshwater Pearl Mussel Flood Plains Hedgerow, Scrub and related habitats Alien invasive species Natura Sites and legislation, Post construction monitoring <p>Licences</p>	
<p>Environmental Protection Agency (EPA) In their response, the EPA highlighted that the EIAR should:</p> <ul style="list-style-type: none"> Identify, describe, and assess all direct and indirect effects on each of the factors listed in Article 3 of the EIA Directive, which in relation to this chapter includes biodiversity and water); Address matters raised by other consultees which included the HSE, IFI, DAFM and DAU; Have regard to the rehabilitation plan(s) required under Condition 10 of the IPC licence Reg No. P5050 for any bog areas relevant to the proposed development; Have regard for the requirements of the draft Guidelines on the information to be contained in Environmental Impact Assessment Reports, as appropriate; Have regard to the relevant topics contained in the EPA's Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) September 2003; Satisfy the requirements of the EIA Directive. 	<p>All biodiversity considerations raised by EPA have been addressed within this chapter (Chapter 7 Biodiversity)</p> <ul style="list-style-type: none"> All impacts both direct and indirect have been addressed in detail in Section 7.8 of this chapter Concerns relating to biodiversity from other consultees have been noted and addressed with appropriate mitigation measures. Relevant literature has been referenced while composing this EIAR TOBIN will ensure the requirements of the EIA Directive are met
<p>Inland Fisheries Ireland (IFI) IFI highlighted the sensitivity of the proposed development site that crosses three catchments: the Oweninny River, the Shanvolahan River and the Cloonaghmore River all of which provide valuable salmon and trout habitat. IFI discussed the damage caused</p>	<p>The construction methodology described in Chapter 3 (Description of the Proposed Development) and set out in the Construction Environmental Management Plan (CEMP) takes into account the best practice guidelines for the</p>

Consultation Response	EIAR Section
<p>to aquatic habitats by peat harvesting activities at Bellacorick in the past.</p> <p>IFI provided 16 recommendations for pre-construction, construction and operational phases of the proposed development to mitigate damage to aquatic species and highlighted the need to address the following concerns:</p> <ul style="list-style-type: none"> • Water quality; • Surface water hydrology; • Fish spawning and nursery areas; • Passage of migratory fish; • Areas of natural heritage importance; • Biological diversity; • Ecosystem structure and functioning; • Sport and commercial fishing and angling; • Sediment transport. 	<p>management of water during construction activities and aligns with the protective measures set out in the IFI submission.</p> <p>Stringent mitigation measures have been outlined in Section 7.10 of this chapter (and within Chapters 10 and 11 (Hydrogeology and Hydrology) which will ensure the protection of the surfaces waterbodies during all works associated with the proposed development.</p>

7.6.3 Desk Study

The ecological desk study for this proposed development included the following steps:

- Identification of KERs and all sites designated for nature conservation within the Zol of the proposed development. Rationale for establishing the Zol included, inter alia, distance from the site (refer to Section 7.5 above).
- A review of all NPWS site synopsises for designated sites within the Zol of the proposed development;
- A species list for the proposed development study area was generated using the National Biodiversity Data Centre biodiversity maps (NBDC; www.biodiversityireland.ie) in order to determine if any rare or protected species have been recorded in this area and the likelihood of any such species being present at the proposed development site. The proposed development site is contained within the hectads F91, F92, G01 and G02, this includes the grid connection which is located within hectad F92. A species list for the 10km grid squares F91, F92, G01, G02 (i.e. the hectads that overlap with the study area, which contain information of ecological records from a wide range of scientific sources readily accessible to the public from the NBDC) was also generated to determine if any rare or protected species occur in the wider Mayo area (assessed in January 2023).
- Flora Protection Order – Bryophytes map viewer: <https://dahg.maps.arcgis.com/apps/webappviewer/index.html?id=71f8df33693f48edbb70369d7fb26b7e> (Accessed on the 09/09/2022)
- A review of Ordnance Survey maps and aerial photography in order to determine the broad habitats that occur within the study area and thus typical bird communities;
- A review of relevant ecological reports, and rehabilitation plans previously completed for the study area; and
- Published data from NPWS, Bat Conservation Ireland, IFI, Botanical Society of Britain and Ireland and BirdWatch Ireland.

7.6.4 Survey Rationale

The surveys were designed following the consideration of the findings of the desk study, a review of the key methodologies and published guidelines and based on typical flora and fauna communities likely to be found within the habitats of the study area.

7.6.5 Field Surveys

Field surveys which related to non-avian species were undertaken by skilled and appropriately experienced ecologists between the periods May 2020 to October 2022 (refer to Table 7-3 below). The data collected was robust and allowed TOBIN to draw accurate, definitive and coherent conclusions on the possible impacts of the proposed development on ecological receptors.

During these surveys, areas of scientific and/or conservation interest in the vicinity of the proposed development were investigated. Relevant survey reports are included as Appendices 7-1 and 7-2 and are summarised in Section 7.7.2. Further details of the survey methodologies are presented in the subsequent paragraphs.

Table 7-3: Survey Works and Periods Conducted

Survey		Survey Dates	Personnel
Habitat Surveys	Habitat walkover and Mapping	Ten days in August 2020 One day in November 2021	TOBIN
Non-volant Mammal Surveys	Badger, Otter, Pine Martin and Red Squirrel Surveys	Ten days in August 2020	TOBIN
Bat Surveys	Bat Surveys – Static Detectors	May to November 2020, and May to September 2022	Bat Eco Services
	Bat Surveys – Walked Transects	May to September 2020 and May to September 2022	Bat Eco Services
Aquatic Surveys	Aquatic Ecological Surveys Kick sampling	One day in August 2020	TOBIN
	Electro-fishing	September 2021	Stillwaters Consultancy

Survey		Survey Dates	Personnel
Marsh Fritillary Surveys	Marsh Fritillary Surveys	Six days between late August and September 2020	TOBIN

7.6.5.1 Habitats

A multi-disciplinary walkover survey following the methodology outlined by ‘*Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*’ (NRA, 2009b)⁷ was undertaken at the proposed turbine locations including all hardstand areas, proposed met mast locations, substation location, grid connection routes, borrow pits, peat deposition areas and internal haul roads. Multi-disciplinary walkover surveys were undertaken during August 2020. These surveys aimed to record the habitats, and flora and fauna present within the survey area as described in the following paragraphs.

Surveys were undertaken of all semi-natural habitats encountered including the collection of data on dominant vegetation, qualitative consideration of plant species diversity, presence of non-native invasive plant species, presence of protected flora, vegetation structure, topography, drainage, disturbance and management. The data was recorded, and the habitats encountered during site visits were classified in accordance with Fossitt (2000)⁸ with reference made to the ‘*Interpretation Manual of EU Habitats*’ (EC, 2013)⁹ as appropriate. Specific surveys of hedgerows and treelines were also undertaken with a view to assessing their importance based on species composition, structure and management. Although hedgerows were not commonly encountered at the site, the methodology used during the survey of hedgerows broadly followed those proposed by Murray (2003)¹⁰. Walkover surveys along watercourses in the vicinity of the proposed development were also undertaken. Watercourse characteristics including bankside vegetation, substrate, and flow rate were recorded with reference to the

⁷ National Roads Authority (NRA; now known as Transport Infrastructure Ireland) (2009b). *Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*. Available from <https://www.tii.ie/technical-services/environment/planning/Ecological-Surveying-Techniques-for-Protected-Flora-and-Fauna-during-the-Planning-of-National-Road-Schemes.pdf>

⁸ Fossitt, J. A. (2000). *A guide to habitats in Ireland*. Heritage Council/Chomhairle Oidhreachta.

⁹ European Commission (2013). *Interpretation Manual of European Habitats*. Eur 28. April 2013.

¹⁰ Murray, A. (2003). *Draft Methodology for a National Hedgerow Survey*. Unpublished Networks for Nature Document

Environment Agency (2003)¹¹ guidelines. An evaluation was made on the suitability of the habitat for aquatic species of conservation concern.

Species identification and nomenclature followed Parnell and Curtis (2012)¹² for higher plants, British Bryological Society (2010)¹³ for bryophytes and Fitter *et al.* (1984)¹⁴ for grasses and sedges.

Following the completion of desktop analysis and field surveys, habitat maps of the of the proposed development site were prepared according to the methodology outlined in Smith *et al.* (2011). The habitat maps detail habitats and habitat complexes recorded within this area. The mapping takes account of whether the habitat determination was made by detailed field survey, visual field inspection from a distance or from remote sensing techniques as recommended by Smith *et al.* (2011).

In addition to habitat surveys, fauna surveys were conducted to assess usage of the areas by mammals, and other fauna such as reptiles and amphibians (and is discussed in the following sections). Considering the characteristics of the habitats present and the nature of the proposed development, it was considered unnecessary to carry out evaluations of more specialised groups such as invertebrate species (with the exception of marsh fritillary) although incidental records of Lepidoptera (butterflies and moths) as per Sterry (2016)¹⁵ and Odonata (dragonflies and damselflies) as per Dijkstra *et al.* (2006)¹⁶ were made.

7.6.5.2 Mammals

Terrestrial mammal surveys were carried out within the proposed development site, targeting potential breeding habitat in the vicinity of the proposed turbine locations. Following the desktop assessment, it was established that the key target mammals potentially occurring within habitats which may be potentially affected by the proposed development are badger (*Meles meles*), otter (*Lutra lutra*) and bat species. Other protected mammal species such as deer species, red squirrel (*Sciurus vulgaris*), pine marten (*Martes martes*), stoat (*Mustela erminea*

¹¹ Environment Agency (2013). River Habitat Survey in Britain and Ireland. Field Survey Guidance Manual: 2003 Version.

¹² Parnell, J., Curtis, T., & Cullen, E. (2012). Webbs An Irish Flora. Cork University Press.

¹³ British Bryological Society, 2010. *Mosses and Liverworts of Britain and Ireland - a field guide*. 1st ed. Plymouth: British Bryological Society.

¹⁴ Fitter, R., & Fitter, A. (1984). *Collins guide to the grasses, sedges, rushes and ferns of Britain and northern Europe*. William Collins Sons & Co. Ltd.

¹⁵ Sterry, P. (2016). *Collins Complete Guide to British Butterflies and Moths*. Published by HaperCollins.

¹⁶ Dijkstra, K.D.B., Bechly, G., Bybee, S.M., Dow, R.A., Dumont, H.J., Fleck, G., Garrison, R.W., Hämäläinen, M., Kalkman, V.J., Karube, H. and May, M.L. (2013). The classification and diversity of dragonflies and damselflies (Odonata). *Zootaxa*, 3703(1), 36-45.

ibernica), Irish hare (*Lepus timidus hibernicus*), hedgehog (*Erinaceus europaeus*), and pygmy shrew (*Sorex minutus*), which are all protected under the Wildlife Acts, may also occur within the proposed development site. The potential for the proposed development to support the above-mentioned protected mammal species was assessed during the field surveys and any evidence of same was recorded.

Badger setts and otter holts tend to be located in unmanaged woody vegetation associated with hedgerows/treelines and in the case of otters, drains and streams linked to more significant foraging habitat e.g. rivers and lakes (Hayden and Harrington 2000)¹⁷. Outside these areas, in managed farmland and/or bare peatlands the risk of disturbance to breeding sites is very low. In this regard mitigation by avoidance was adopted in those areas not subject to walkover surveys by ensuring that turbine locations are constrained away from areas that provide suitable badger or otter habitat as described above. The presence of other protected species including Irish hare, pine marten and red squirrel were recorded if signs were observed. Other common mammal species were also noted. All signs and tracks were evaluated as they were encountered in the field (Bang *et al.*, 2004)¹⁸.

Survey methods adopted during the target species surveys, for otter, badger and bat are outlined as follows.

7.6.5.2.1 Otter

During the terrestrial mammal surveys, otter surveys were conducted in accordance with NRA (2009b)⁷ guidelines, at waterbodies close to any proposed infrastructure site to confirm otter presence in the area. In addition, all drains and watercourses at lands accessed were checked for signs of otter presence and activity such as holts (breeding and temporary), slides and territorial marking points (spraints), with each sign recorded.

7.6.5.2.2 Badger

During the multi-disciplinary surveys, badger activity was determined by field surveys for setts, trails, latrines and feeding signs in accordance with NRA (2005b)¹⁹. Surveys for badger activity were undertaken at the proposed development site, paying particular attention to suitable habitat in proximity to the proposed infrastructure sites.

¹⁷ Hayden, T. J., & Harrington, R. (2000). *Exploring Irish Mammals*. Town House.

¹⁸ Bang, P., Dahlstrøm, P., & Walters, M. (2001). *Animal tracks and signs*. Oxford university press.

¹⁹ NRA (2005b) Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes

7.6.5.2.3 Bats

Bat surveys were undertaken by Bat Eco Services across two survey seasons: May to November 2020 and May to September 2022. A copy of the reports is included in Appendix 7.2 of this EIAR. The surveys were undertaken in line with SNH guidelines, '*Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation*' (SNH, 2019)²⁰.

Bat Eco Services undertook a number of different types of bats surveys to gather information on the local bat fauna of the proposed development site including:

- Passive surveillance Surveys (Static surveys),
- Dawn and Dusk Bat Surveys,
- Walking and Driving Transects,
- Daytime Building Inspections,
- Trapping/ Mist Netting,
- Endoscope Inspections,
- Infrared Camcorder Filming.

Passive surveillance surveys include the deployment of static bat detectors to record the types of bat species present and to provide an overview of how bat activity is broadly distributed over the site.

Walked/driven transects are complimentary to data collected from static bat detectors and are important for identifying flight lines and for gaining understanding of bat abundance within the survey area.

Roost surveys were undertaken to identify maternity roosts and significant hibernation or swarming roosts within the proposed development site boundary within 200m plus rotor radius. Bat Conservation Trust (BTC) recommends that roost surveys are conducted within 200m of "developable lands" on the site (Hundt, 2012)²¹ and the SNH (2019)²⁰ guidelines stipulate a search area of 200m plus the radius of the rotor swept area.

Daytime inspections of possible roost sites were conducted to determine potential roost suitability. The guidelines used for assessing tree roost suitability follow the 'Negligible, Low, Moderate and High' classification described in '*Bat Surveys for Professional Ecologists: Good Practice Guidelines*' (Collins (ed.), 2016)²².

²⁰ SNH (2019) Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation

²¹ Bat Conservation Trust (London), & Hundt, L. (2012). Bat surveys: good practice guidelines. Bat Conservation Trust.

²² Collins (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). The Bat Conservation Trust, London

Dusk surveys were conducted at potential roost sites to assess if bats emerged from roosts and dawn surveys were conducted to determine if bats re-entered roosts. Trapping and infrared camcorder surveys were used to determine if buildings within the proposed development were used as maternity roosts and to accurately ascertain numbers using it.

In addition, the monitoring of climatic conditions was also undertaken to collect site specific weather data including wind speed, temperature, and rainfall. The site-specific weather data is important for the interpretation of bat activity data recorded for a given site.

7.6.5.3 Fisheries and Aquatic Ecology

Aquatic surveys involved the visual survey of watercourses located within or within proximity to the proposed development site and where possible more in-depth macroinvertebrate sampling and electro-fishing was also conducted. Watercourse characteristics including bankside vegetation, substrate and flow rate were recorded. An assessment was made on the suitability of the habitat for aquatic species of conservation concern (e.g. white-clawed crayfish [*Austropotamobius pallipes*] and Atlantic salmon [*Salmo salar*]). Watercourses were mapped according to Fossitt (2000)⁸. A total of seven locations were surveyed. The results of water sampling carried out in surrounding watercourses are detailed in Chapters 10 and 11: Hydrogeology and Hydrology.

Kick sampling was carried out in August 2020 at four suitable and accessible sites within and in the vicinity of proposed development site boundary. Kick sampling involved the use of a standard 1mm mesh D-shaped kick net, which was placed on the riverbed with the mouth of the net directed upstream. The area just upstream of the net was disturbed (with the foot, in a kicking motion) for two minutes in order to dislodge invertebrates, which were subsequently caught in the net. Different habitats in the waterbody, such as fast-moving riffles, shallow water, and slow water were sampled during the two minutes to ensure that a sample representative of the site was collected. After kick sampling, stone washing and weed sweeping were also carried out at available habitats (Toner *et al.*, 2005)²³. All samples of invertebrates were combined for each site and live sorted on the riverbank and identified to the level required to assign a Q-rating score.

Electro-fishing was carried out in September 2021 in order to characterise the fish populations of surveyed watercourses. Electro-fishing sites were selected on the basis of suitability /

²³ Toner, P., Bowman, K., Clabby, K., Lucey, J., McGarrigle, M., Concannon, C., Clenaghan, C., Cunningham, P., Delaney, J., O'Boyle, S., MaCarthaigh, M., Craig, M., and Quinn, R. (2005). Water Quality in Ireland 2001-2003. Environmental Protection Agency, Wexford.

accessibility and located as close as practical to aquatic sampling sites (refer to Figure 7-7). A timed (10-minute) electro-fishing method (Matson et al., 2017)²⁴ was used. The electro-fishing equipment utilised was a backpack-mounted unit, FEG 1500, manufactured by EFKO, Leutkirch im Allgäu, Germany. A voltage of approximately 150V (variable) pulsed DC with a pulse rate of 50Hz was used for most sites. An Electrocatch, ELBP2 backpack, was available as a backup. The survey complied with the Certificate of Authorisation provide by the Department of Communications, Climate Action & Environment.

The species and the number caught were recorded along with measurement of length, recorded in centimetre (cm). Fork lengths are recorded for salmon and trout and full lengths for other species. The carapace length (cm) is given for crayfish. Fish species were ages/development type were also recorded (e.g. fish are designated as (0+) in their first year and (1+) in their second year.).

7.6.5.4 Other Fauna

The common frog (*Rana temporaria*), smooth newt (*Triturus vulgaris*) and common lizard (*Lacerta vivipara*) are all protected species under the Wildlife Acts and have a widespread distribution in Ireland. Each of these species has the potential to occur within the proposed development site due to the presence of suitable habitat. Pools, ponds, drainage ditches and wet grasslands provide suitable habitat for the protected amphibians species in the area. The common lizard is widespread in suitable habitats such as dry banks, heathland and bog habitats. These species and potential breeding habitat were noted if seen.

A desk study and ecological walkover survey were carried out in August 2020 to identify areas of potentially suitable habitat for the marsh fritillary (*Eurodryas aurinia*). The species is widespread in Ireland and can be reasonably common if suitable habitat is present. Although widespread, it is also listed as vulnerable on the red list of Irish butterflies (Regan *et al.* 2010)²⁵ due to habitat loss and degradation. The species is protected under Annex II of the Habitats Directive and is listed under the Wildlife Acts.

Targeted surveys for marsh fritillary were subsequently carried out during late August and September 2020 in areas of potentially suitable habitat or in the vicinity of a known record

²⁴ Matson, Ronan & Delanty, Karen & Shephard, Samuel & Coghlan, Brian & Kelly, Fiona. (2017). Moving from multiple pass depletion to single pass timed electrofishing for fish community assessment in wadeable streams. Fisheries Research.

²⁵ Regan, E.C., Nelson, B., Aldwell, B., Bertrand, C., Bond, K., Harding, J., Nash, D., Nixon, D., & Wilson, C.J. (2010) Ireland Red List No. 4 – Butterflies. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Ireland.

within the proposed development site. There are several areas holding patches of devil's-bit scabious (*Succisa pratensis*) (the larval food plant for marsh fritillary) located throughout the proposed development site. Marsh fritillary were surveyed for by conducting larval and habitat suitability surveys. Weather conditions were considered suitable for surveying. Ideally, larval surveys should be carried out in sunny conditions when colonies of individuals are known to construct conspicuous webs over devil's-bit scabious leaves and adjacent vegetation. Suitability of the habitats for marsh fritillary was assessed according to the following categories, which provide an approximate gradation of habitat suitability (from highly suitable to not suitable): 'Good condition'; 'Suitable, under-grazed'; 'Suitable, overgrazed'; 'Suitable, sparse'; 'Overspill'; 'Potential, rank'; 'Not suitable'. The assessment was based upon percentage of purple moor-grass and devil's-bit scabious, scrub cover, sward height and presence of tussocks (NRA 2009b)⁷.

Taking into consideration the species that the habitats of the proposed development site are likely to support, coupled with the characteristics of the proposed development, it was considered unnecessary to carry out field surveys of other more specialised faunal groups including fungi, invertebrates and moths.

7.6.6 Baseline Evaluation Criteria

Ecological resources/receptors are evaluated following NRA (2009c)² guidelines (refer to Table 7-4 below) which set out the importance of the resource/receptor in a geographic context. These guidelines are consistent with the approach recommended in the' (CIEEM, 2018)²⁶ guidance.

The information gathered from desk studies and field surveys was used to make an Ecological Impact Assessment (EclA) of the proposed development upon the identified ecological receptors on an importance scale ranging from international - national - county importance - local importance, higher value - local importance, lower value. Those features identified as being of higher local importance or greater, are then given particular mention in the ecological evaluation as KERs when considering the potential for significant impacts and subsequent requirement for appropriate mitigation. The criteria shown in Table 7-4 have been used in evaluating ecological value within the study area.

In addition, to the criteria listed in Table 7-4 the evaluation of habitats and species also considers other factors such as potential ecological value, secondary supporting values where habitats

²⁶ 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.

may perform a secondary ecological function and the social values of an ecological feature such as educational, recreational and economic value.

All potential impacts are assessed against parameters as set out within the NRA guidance (NRA 2009c)²⁷ and take cognisance of guidance produced by the EPA (EPA, 2022²⁷ and CIEEM (CIEEM, 2018)²⁶. Via this approach, a scientific and repeatable method is applied whereby all aspects of a potential impact are considered. Unless otherwise stated, impacts identified in the assessment are considered to be adverse.

The following parameters are described when characterising impacts (following CIEEM [2018], EPA [2022] and NRA [2009c]):

- **Direct and Indirect Effects:** An effect can be caused either as a direct or as an indirect consequence of a proposed development;
- **Magnitude:** Magnitude measures the size of an effect, which is described as high, medium, low or negligible;
- **Extent:** The area over which the effect occurs – this should be predicted in a quantified manner;
- **Duration:** The time for which the effect is expected to last prior to recovery or replacement of the resource or feature;
- **Temporary:** Effects lasting less than a Year;
- **Short Term:** The effects would take 1-7 years to be mitigated;
- **Medium Term:** The effects would take 7-15 years to be mitigated;
- **Long Term:** The effects would take 15-60 years to be mitigated;
- **Permanent:** The effects would take 60+ years to be mitigated;
- **Likelihood:**
 - Certain/Near Certain: >95% chance of occurring as predicted;
 - Probable: 50-95% chance as occurring as predicted;
 - Unlikely: 5-50% chance as occurring as predicted and
 - Extremely Unlikely: <5% chance as occurring as predicted.
- **Frequency and Timing:** The timing of effects in relation to important seasonal and/or life-cycle constraints should be evaluated. Similarly, the frequency with which activities (and concomitant impacts) would take place can be an important determinant of the impact on receptors and should also be assessed and described;
- **Reversibility:** An irreversible effect is one from which recovery is not possible within a reasonable timescale or there is no reasonable chance of action being taken to reverse it. A reversible effect is one from which spontaneous recovery is possible or which may be counteracted by mitigation.

²⁷ Environmental Protection Agency (EPA) (2022). Guidelines on the information to be contained in Environmental Impact Assessment Reports.

Table 7-4: Criteria for Establishing Receptor Importance (NRA, 2009)²

Importance	Ecological Valuation
International Importance	<ul style="list-style-type: none"> • European Site including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation. • Proposed Special Protection Area (pSPA). • Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended). • Features essential to maintaining the coherence of the Natura 2000 Network. • Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive. • Resident or regularly occurring populations (assessed to be important at the national level) of the following: <ul style="list-style-type: none"> ○ Species of bird listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or ○ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive. • Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971). • World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972). • Biosphere Reserve (UNESCO Man & The Biosphere Programme). • Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979). • Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979). • Biogenetic Reserve under the Council of Europe. • European Diploma Site under the Council of Europe. • Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).
National Importance	<ul style="list-style-type: none"> • Site designated or proposed as a Natural Heritage Area (NHA). • Statutory Nature Reserve. • Refuge for Fauna and Flora protected under the Wildlife Acts. • National Park. • Undesignated site fulfilling the criteria for designation as an NHA, Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Acts; and/or a National Park. • Resident or regularly occurring populations (assessed to be important at the national level) of the following: <ul style="list-style-type: none"> ○ Species protected under the Wildlife Acts; and/or ○ Species listed on the relevant Red Data list. • Site containing 'viable areas' of the habitat types listed in Annex I of the Habitats Directive.
County Importance	<ul style="list-style-type: none"> • Area of Special Amenity. • Area subject to a Tree Preservation Order. • Area of High Amenity, or equivalent, designated under the County Development Plan. • Resident or regularly occurring populations (assessed to be important at the County level) of the following: <ul style="list-style-type: none"> ○ Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;

Importance	Ecological Valuation
	<ul style="list-style-type: none"> ○ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; ○ Species protected under the Wildlife Acts; and/or ○ Species listed on the relevant Red Data list. ● Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance. ● County important populations of species or viable areas of semi-natural habitats or natural heritage features identified in the National or Local Biodiversity Action Plan (BAP), if these have been prepared. ● Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county. ● Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.
Local Importance (Higher Value)	<ul style="list-style-type: none"> ● Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared. ● Resident or regularly occurring populations (assessed to be important at the Local level) of the following: <ul style="list-style-type: none"> ○ Species of bird listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; ○ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; ○ Species protected under the Wildlife Acts; and/or ○ Species listed on the relevant Red Data list. ● Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality; ● Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
Local Importance (Lower Value)	<ul style="list-style-type: none"> ● Sites containing small areas of semi-natural habitat that are of some local importance for wildlife. ● Sites or features containing non-native species that are of some importance in maintaining habitat links.

The following parameters are described when characterising significance of effects (source: EPA, 2022)²⁷:

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

Based on these parameters, an effect is then considered to be either significant or not significant and likely to be either beneficial or adverse. Likely significant effects are predicted on the basis of the proposed development as set out in Chapter 3 (Description of the Proposed Development).

7.7 EXISTING ENVIRONMENT

7.7.1 *Desktop Study Results*

The findings of the desktop assessment are detailed hereunder.

7.7.1.1 *Designated Conservation Sites*

Site of International Importance

The Habitats Directive (92/42/EEC) put an obligation on EU Member States to establish the Natura 2000 network. The Natura 2000 network comprises sites of the highest biodiversity importance for rare and threatened habitats and species across the EU. In Ireland, the Natura 2000 network of European sites comprises SACs and SPAs; SACs are selected for the conservation of Annex I habitats (including priority types which are in danger of disappearance) and Annex II species (other than birds), while SPAs are selected for the conservation of Annex I birds and other regularly occurring migratory birds and their habitats. Potential effects on Natura 2000 sites are addressed in the Screening for Appropriate Assessment (AA) and NIS reports which accompany this planning application. The Screening for AA Report investigated the potential for the proposed development to have significant effects on European Site(s), either alone or in-combination, with other plans or projects.

In this chapter only SACs will be outlined further, details on the SPAs can be found in Chapter 8 (Ornithology).

Nine SACs occur within 15km of the proposed development site and/or are over 15km away but a potential pathway for effect was identified, such as surface water connectivity. Figure 7-1 illustrates the location of these European sites. Distances from each European site to the proposed development and identified potential pathways for effect are provided in Table 7-5.

Sites of National Importance

Natural Heritage Areas (NHAs) are the basic wildlife designation in Ireland. These areas are considered nationally important for the habitats present or which holds species of plants and animals whose habitats needs protection. Under the Wildlife Acts, NHAs are legally protected

from damage from the date they are formally proposed for designation (source: www.npws.ie). Proposed Natural Heritage Areas (pNHAs) were published on a non-statutory basis in 1995 and have not since been statutorily proposed or designated.

There are five NHAs and ten pNHAs located within the 15km buffer of the proposed development site or those over 15km away but where a potential pathway for effect was identified, such as surface water connectivity. All NHAs and pNHAs are illustrated on Figure 7-1. And discussed in Table 7-5 below.

Other National Sites

Other sites of nature conservation within the Zol or within 15km of the proposed development site are discussed hereunder:

- There is one National Park (Ballcroy National Park) located within 15km of the proposed development site.
- Three Nature Reserves; Owenduff Catchment Nature Reserve, Owenboy, Nature Reserve and Knockmoyle Sheskin Nature Reserve occur within 15km of the proposed development site.
- Three RAMSAR sites; Owenduff Catchment, Owenboy, and Knockmoyle/Sheskin occur within 15km of the proposed development site.

Table 7-5: Designated Sites

Designated sites	Distance from proposed development	Qualifying Interests / Special Conservation Interests	Potential Pathway for Effect
International Sites (European Sites)			
Lough Dahybaun SAC [002177]	0km (the European site overlaps the proposed development site boundary, however the nearest proposed infrastructure, a contractor's compound, is located 130m to the west of the SAC)	Slender Naiad (<i>Najas flexilis</i>) (1833)	This SAC is partially located within the proposed development site boundary. The proposed construction works will not result in direct habitat loss within the SAC. But the proposed development is hydrologically connected to the protected site. There is potential for habitat loss/degradation from the run-off of sediments and pollutants from the site, machinery and/or storage materials.

Designated sites	Distance from proposed development	Qualifying Interests / Special Conservation Interests	Potential Pathway for Effect
			A source-pathway-receptor link exists between the proposed development and the SAC.
Bellacorick Bog Complex SAC [001922]	0km (the European site runs alongside the north-eastern boundary of the proposed development. However, the nearest proposed infrastructure will be located 225m south of the European site).	<p>3160 Natural dystrophic lakes and ponds</p> <p>4010 Northern Atlantic wet heaths with <i>Erica tetralix</i></p> <p>7130 Blanket bogs (* if active bog)</p> <p>7150 Depressions on peat substrates of the Rhynchosporion</p> <p>7230 Alkaline fens</p> <p>1528 Marsh Saxifrage (<i>Saxifraga hirculus</i>)</p> <p>1013 Geyer's Whorl Snail (<i>Vertigo geyer</i>)</p>	<p>The SAC borders the south and east of the proposed development site.</p> <p>The proposed construction works will not result in direct habitat loss within the SAC. The nearest works will be approximately 225m from the SAC, thus occurs outside the Zol for dust effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SAC.</p> <p>The proposed development is hydrologically connected to the protected site via surface waters but not connected to any of the sites qualifying interest species or habitat. Therefore, there is no potential for habitat loss/degradation from surface water run-off of sediments and pollutants from the site, machinery and/or storage materials.</p> <p>The Proposed Development is connected to the SAC via ground water links. Both the proposed development site and the SAC occur within the Belmullet Groundwater Body, however finding</p>

Designated sites	Distance from proposed development	Qualifying Interests / Special Conservation Interests	Potential Pathway for Effect
			<p>from the Soil and Geology and the Hydrogeology chapters of the EIAR accompanying this proposed development (Chapter 9 and Chapter 10) reveal due to the distances from the nearest construction works and the soils and geology of the area within the proposed development area and the SAC. There is no potential for impacts as a result of ground water changes.</p> <p>No source-pathway-receptor link exists between the proposed development site and the SAC.</p>
Bellacorick Iron Flush SAC [000466]	Ca. 400m north of the proposed development site boundary	1528 Marsh Saxifrage (<i>Saxifraga hirculus</i>)	<p>There is no surface water hydrological connectivity between the proposed development site and the SAC.</p> <p>The proposed construction works will not result in direct habitat loss within the SAC. The nearest works will be approximately 225m from the SAC, thus occurs outside the ZoI for dust effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SAC.</p> <p>Both the proposed development site and the SAC occur within the Belmullet Groundwater Body. Marsh saxifrage</p>

Designated sites	Distance from proposed development	Qualifying Interests / Special Conservation Interests	Potential Pathway for Effect
			<p>requires a stable, moving water table close to the soil surface (NPWS, 2019)²⁸. A hydrogeological conceptual model was prepared and found that around the iron flush comprised of blanket peat overlying 20 to 30m of sandstone till (mineral subsoil). The underlying parent material (i.e., bedrock) is mapped as bedded siltstone/sandstones. Areas where peat is absent are generally located on the elevated ground 100m to the east of the iron flush. The ground water zone of contribution to the Iron Flush was delineated as part of the 2013 Oweninny Wind farm (phases 1 and 2) application²⁹. It was found that the zone of contribution to the flush does not extend into the Phase 3 development. As there are no construction works in the ground water catchment of the iron flush, there is no potential for impacts to the qualifying interests.</p> <p>No source-pathway-receptor link exists between the proposed development site and the SAC.</p>

²⁸ NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview. Unpublished NPWS report.

²⁹ ESB Wind Development & Bord na Móna (2013), Oweninny Wind Farm, Environmental Impact Statement: Chapter 18 Hydrogeology of Iron Flush Areas.

Designated sites	Distance from proposed development	Qualifying Interests / Special Conservation Interests	Potential Pathway for Effect
River Moy SAC [002298]	Ca. 2.5km south of the proposed development site boundary	<p>7110 Active raised bogs*</p> <p>7120 Degraded raised bogs still capable of natural regeneration</p> <p>7150 Depressions on peat substrates of the Rhynchosporion</p> <p>7230 Alkaline fens</p> <p>91A0 Old sessile oak woods with Ilex and Blechnum in the British Isles</p> <p>91E0 Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)*</p> <p>1096 Brook Lamprey (<i>Lampetra planeri</i>)</p> <p>1106 Salmon (<i>Salmo salar</i>)</p> <p>1355 Otter (<i>Lutra lutra</i>)</p> <p>1092 White-clawed Crayfish (<i>Austropotamobius pallipes</i>)</p> <p>1095 Sea Lamprey (<i>Petromyzon marinus</i>)</p>	<p>The proposed development is hydrologically connected to the SAC via the Shanvolahan River, which flows approximately 6.5km from the proposed development site into the Deel River (which forms part of the SAC).</p> <p>There is potential for habitat loss/degradation from surface water run-off of sediments and pollutants from the site, machinery and/or storage materials. As well as impacts to habitats which support the aquatic species within the SAC.</p> <p>Although the proposed development occurs outside the SAC boundary there is potential that the Shanvolahan River may support populations of the aquatic Qualifying Interest species within the SAC.</p> <p>A source-pathway-receptor link exists between the proposed development site and the SAC.</p>
Owenduff/Nephin Complex SAC [000534]	Ca. 3.8km south west of the proposed development site boundary	<p>3110 Oligotrophic waters containing very few minerals of sandy plains</p>	<p>This SAC is located Approximately 3.8km west of the proposed development site and thus occurs outside the Zol of direct habitat impacts and dust effects.</p>

Designated sites	Distance from proposed development	Qualifying Interests / Special Conservation Interests	Potential Pathway for Effect
		<p>(<i>Littorelletalia uniflorae</i>)</p> <p>3160 Natural dystrophic lakes and ponds</p> <p>3260 Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and Callitricho-Batrachion vegetation</p> <p>4010 Northern Atlantic wet heaths with <i>Erica tetralix</i></p> <p>4060 Alpine and Boreal heaths</p> <p>5130 <i>Juniperus communis</i> formations on heaths or calcareous grasslands</p> <p>7130 Blanket bogs (* if active bog)</p> <p>7140 Transition mires and quaking bogs</p> <p>1528 Marsh Saxifrage (<i>Saxifraga hirculus</i>)</p> <p>1106 Salmon (<i>Salmo salar</i>)</p> <p>1393 Slender Green Feather-moss (<i>Drepanocladus vernicosus</i>)</p> <p>1355 Otter (<i>Lutra lutra</i>)</p>	<p>Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SAC.</p> <p>The proposed development is hydrologically connected to the Owenmore River which runs along the outer northern boundary of the SAC. The river however is located downstream of all the tributaries located within the SAC. There is therefore no hydrological connectivity between the proposed development site and the SAC.</p> <p>No source-pathway-receptor link exists between the proposed development site and the SAC.</p>

Designated sites	Distance from proposed development	Qualifying Interests / Special Conservation Interests	Potential Pathway for Effect
Carrowmore Lake Complex SAC [000476]	Ca. 4.5km west of the proposed development site boundary	<p>7130 Blanket bogs (* if active bog)</p> <p>7150 Depressions on peat substrates of the <i>Rhynchosporion</i></p> <p>1393 Slender Green Feather-moss (<i>Hamatocaulis vernicosus</i>)</p> <p>1528 Marsh Saxifrage (<i>Saxifraga hirculus</i>)</p>	<p>This SAC is located Approximately 4.5km west of the proposed development site and thus occurs outside the ZoI of direct habitat impacts and dust effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SAC.</p> <p>There is no surface water hydrological connectivity between the proposed development site and the SAC.</p> <p>The SAC is designated for groundwater dependent habitats and species. Both the SAC and the proposed development site are located within the same groundwater body and therefore hydrogeological connectivity exists. However as the SAC is located, at the closest point, approximately 4.8km from the proposed development there is no potential for impacts to the qualifying interests.</p> <p>No source-pathway-receptor links exists between the proposed development site and the SAC.</p>

Designated sites	Distance from proposed development	Qualifying Interests / Special Conservation Interests	Potential Pathway for Effect
Glenamoy Bog Complex SAC [000500]	Ca. 7km northwest of the proposed development site boundary	<p>1230 Vegetated Sea cliffs of the Atlantic and Baltic coasts</p> <p>21A0 Machairs (* in Ireland)</p> <p>3160 Natural dystrophic lakes and ponds</p> <p>4010 Northern Atlantic wet heaths with <i>Erica tetralix</i></p> <p>5130 <i>Juniperus communis</i> formations on heaths or calcareous grasslands</p> <p>7130 Blanket bogs (* if active bog)</p> <p>7140 Transition mires and quaking bogs</p> <p>7150 Depressions on peat substrates of the Rhynchosporion</p> <p>1106 Salmon (<i>Salmo salar</i>)</p> <p>1395 Petalwort (<i>Petalophyllum ralfsii</i>)</p> <p>1528 Marsh Saxifrage (<i>Saxifraga hirculus</i>)</p> <p>1393 Slender Green Feather-moss (<i>Hamatocaulis vernicosus</i>)</p>	<p>The SAC is located 7km north west of the proposed development site and thus occurs outside the ZoI of direct habitat impacts and dust effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SAC.</p> <p>There is no surface water hydrological connectivity between the proposed development site and the SAC. There is no potential for impacts to the aquatic designated species.</p> <p>The SAC is designated for groundwater dependent habitats. The proposed development site occurs within the Belmullet Groundwater Body. The SAC occurs within the Bangor groundwater body. There is therefore no hydrogeological connectivity between the SAC and the proposed development.</p> <p>No source-pathway-receptor links exists between the proposed development site and the SAC.</p>

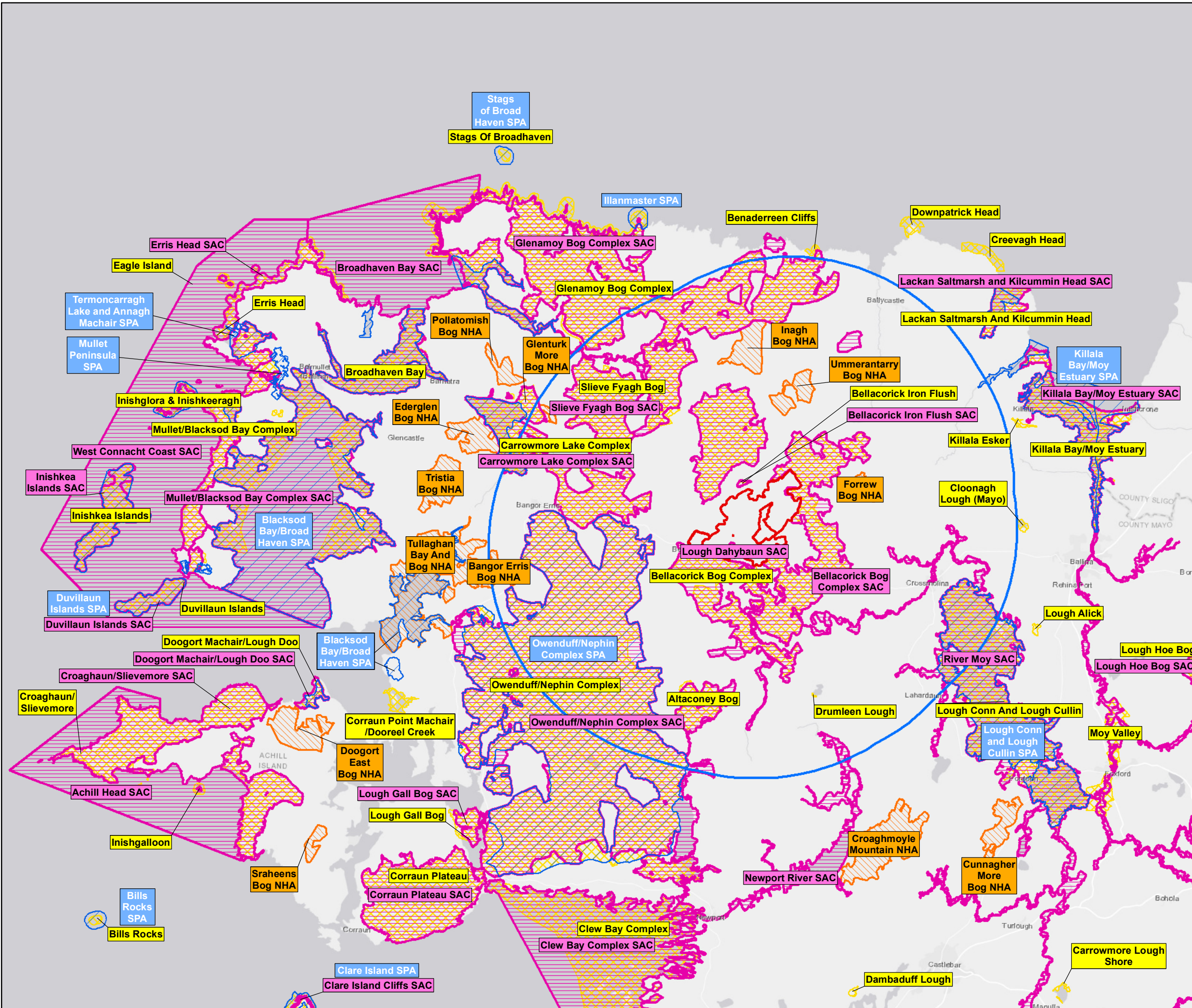
Designated sites	Distance from proposed development	Qualifying Interests / Special Conservation Interests	Potential Pathway for Effect
Slieve Fyagh Bog SAC [000542]	Ca. 7.5km northwest of the proposed development site boundary	7130 Blanket bogs (* if active bog)	<p>The SAC is located 7.5km north west of the proposed development site and thus occurs outside the ZoI of direct habitat impacts and dust effects. Similarly, due to the distance there is no potential for the introduction of invasive plant species within the SAC.</p> <p>There is no surface water hydrological connectivity between the proposed development site and the SAC. There is no potential for impacts to the aquatic designated species.</p> <p>The SAC is designated for groundwater dependent habitats. The proposed development site occurs within the Belmullet Groundwater Body. The SAC occurs within the Bangor Groundwater Body. There is therefore no hydrogeological connectivity between the SAC and the proposed development.</p> <p>No source-pathway-receptor links exists between the proposed development site and the SAC.</p>
Newport River SAC [002144]	Ca. 12.5km southeast of the proposed development site boundary	1029 <i>Margaritifera margaritifera</i> (Freshwater Pearl Mussel) 1106 <i>Salmo salar</i> (Salmon)	The SAC is located 12.5km south of the proposed development site and thus occurs outside the ZoI of direct habitat impacts and dust effects. Similarly, due to the distance there is no potential for the introduction of invasive

Designated sites	Distance from proposed development	Qualifying Interests / Special Conservation Interests	Potential Pathway for Effect
			<p>plant species within the SAC.</p> <p>There is no surface water hydrological connectivity between the proposed development site and the SAC and both occur in separate sub catchments. There is no potential for impacts to the aquatic designated species.</p> <p>No source-pathway-receptor links exists between the proposed development site and the SAC.</p>
National Sites			
Forrew Bog NHA [002432]	Ca. 3km east of the proposed development site boundary	NA	Given that this NHA is located upstream of the proposed development and 3km away, no source-pathway-receptor link could be identified. No potential for significant effects was identified.
Ummerantary Bog NHA [001570]	Ca. 4km north of the proposed development site boundary	NA	Given that this NHA is located upstream of the proposed development and 4km away, no source-pathway-receptor link could be identified. No potential for significant effects was identified.
Inagh Bog NHA [002391]	Ca. 7km north of the proposed development site boundary	NA	Given that this NHA is located upstream of the proposed development and ca. 7km away, no source-pathway-receptor link could be identified. No potential for significant effects was identified.
Glenturk More Bog NHA [002419]	Ca. 13km northwest of the proposed development site boundary	NA	Given that this NHA is located in a separate sub-catchment to the proposed development

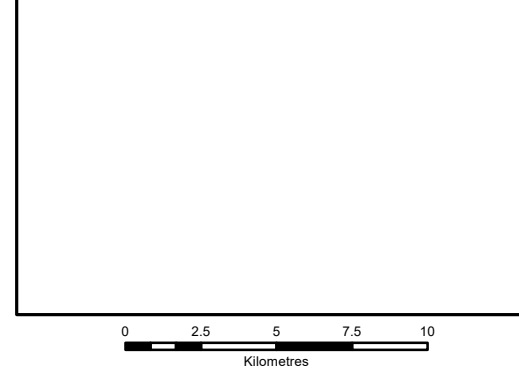
Designated sites	Distance from proposed development	Qualifying Interests / Special Conservation Interests	Potential Pathway for Effect
			and ca. 13km away, no source-pathway-receptor link could be identified. No potential for significant effects was identified.
Bangor Erris Bog NHA [001473]	Ca. 13km southwest of the proposed development site boundary	NA	Given that this NHA is located in a separate sub-catchment to the proposed development and ca. 13km away, no source-pathway-receptor link could be identified. No potential for significant effects was identified.
Bellacorick Bog Complex pNHA [001922]	0km (the designated site runs alongside the proposed site boundary)	NA	Due to the proximity of this pNHA with the proposed development site and that surface water connectivity exists, a viable pathway for potential effects on proposed development was identified and will be considered further in this assessment.
Altaconey Bog pNHA [000459]	Ca. 9km south of the proposed development site boundary 7km north of the proposed development site boundary	NA	Given that this pNHA is located in a separate sub-catchment to the proposed development and is located an excess of 9km away, no source-pathway-receptor link could be identified. No potential for significant effects was identified.
Drumleen Lough pNHA [001499]	Ca. 10km south of the proposed development site	NA	Given that this pNHA is located upstream in the catchment of the proposed development and is located ca. 10km away, no source-pathway-receptor link could be identified. No potential for significant effects was identified.
Lough Conn And Lough Cullin pNHA [000519]	Ca. 11km southeast of the proposed development site	NA	Given that this pNHA is located in a separate sub-catchment to the proposed development and located ca. 11km away, no source-

Designated sites	Distance from proposed development	Qualifying Interests / Special Conservation Interests	Potential Pathway for Effect
			pathway-receptor link could be identified. No potential for significant effects was identified.
Cloonagh Lough (Mayo) pNHA [001485]	Ca. 15km east of the proposed development site	NA	Given that this pNHA is located in a separate sub-catchment to the proposed works and is located 15km away, no source-pathway-receptor link could be identified. No potential for significant effects was identified.
Other National Sites NA			
Knockmoyle, Sheskin Nature Reserve	Ca. 700m northwest of the proposed development site	NA	Given that this Natura Reserve is located upstream of the proposed development and located ca. 700m away, no source-pathway-receptor link could be identified. No potential for significant effects was identified.
Owenboy, Nature Reserve	Ca. 2km south of the proposed development site	NA	Although this Natura Reserve is located downstream of the proposed development, it has been designated for terrestrial habitats and rare species of moss. Considering the distance and lack of hydrological connectivity to the scientific interests, there is no potential for significant effects.
Knockmoyle/Sheskin RAMSAR Site (Code: 372)	Ca. 700m north of the proposed development site	NA	Given that this RAMSAR site is located upstream of the proposed development and ca. 700m away, no source-pathway-receptor link could be identified. No potential for significant effects was identified.
Owenboy RAMSAR Site (Code: 371)	Ca. 2km south of the proposed development site	NA	Although this RAMSAR site is located downstream of the proposed development, it has been designated for terrestrial habitats

Designated sites	Distance from proposed development	Qualifying Interests / Special Conservation Interests	Potential Pathway for Effect
			and rare species of moss. Considering the distance and lack of hydrological connectivity to the scientific interests, there is no potential for significant effects were identified.
Owenduff Catchment RAMSAR site (Code: 336)	Ca. 13km west of the proposed development site	NA	Given that this RAMSAR site is located in a separate sub-catchment to the proposed development and is located 13km away, no source-pathway-receptor link could be identified. No potential for significant effects was identified.
Ballycroy National Park	Ca. 13kms southwest of the proposed development site	NA	Given that this National Park is located in a separate sub-catchment to the proposed development and is located ca. 13km southwest, no source-pathway-receptor link could be identified. No potential for significant effects was identified.



- Legend**
- Planning Application Boundary
 - 15km Buffer from Planning Application Boundary
 - Special Protection Area (SPA)
 - Special Area of Conservation (SAC)
 - Natural Heritage Area (NHA)
 - proposed Natural Heritage Area (pNHA)



- NOTES**
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
 2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
 3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
 4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
D02	22/03/2023	Draft issue	S.P.	J.D.
D01	01/02/2023	Draft issue	S.P.	J.S.

Client: **Bord na Móna**

Project: **Oweninny Wind Farm Phase 3**

Title: **Figure 7-1: Designated Sites**

Scale @ A3: 1:250,000

Prepared by: S.Pezzetta Checked: J.Sherry Date: March 2023

Project Director: D.Grehan

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Draft: **D02**

10889-009-D.S-BUF15-TOB-D02

7.7.1.2 National Biodiversity Data Centre Data

A search of the NBDC database was carried out for protected flora and fauna (excluding avifauna) and species listed under the Third Schedule of the Birds and Natural Habitats Regulations (2011) within hectads F91, F92, G01 and G02 which encompass the proposed development site. Results of protected flora and fauna are listed in Table 7-6 and Third Schedule invasive species in Table 7-7 below.

Table 7-6: Protected Flora and Fauna

Species Group	Species name	Hectad	Conservation status
Fauna	Common Frog (<i>Rana temporaria</i>)	F91, G01, G02	EU HD Annex V, WA
Fauna	Freshwater White-clawed Crayfish (<i>Austropotamobius pallipes</i>)	G01	EU HD Annex II, V
Fauna	Marsh Fritillary (<i>Euphydryas aurinia</i>)	F92, G01	EU HD Annex II
Fauna	Geyer's Whorl Snail (<i>Vertigo (Vertigo) geyeri</i>)	G01, G02	EU HD Annex II
Fauna	Common Lizard (<i>Zootoca vivipara</i>)	F92	WA
Fauna	Fallow Deer (<i>Dama dama</i>)	G01	WA
Fauna	European Otter (<i>Lutra lutra</i>)	F91, F92, G01, G02	EU HD Annex II, VI, WA
Fauna	Brown Long-eared Bat (<i>Plecotus auritus</i>)	F92, G01	EU HD Annex VI, WA
Fauna	Daubenton's Bat (<i>Myotis daubentonii</i>)	F91, F92, G01, G02	EU HD Annex VI, WA
Fauna	Lesser Noctule (<i>Nyctalus leisleri</i>)	F91, F92, G01, G02	EU HD Annex VI, WA
Fauna	Pipistrelle (<i>Pipistrellus pipistrellus</i> sensu lato)	F92, G01	EU HD Annex VI, WA
Fauna	Soprano Pipistrelle (<i>Pipistrellus pygmaeus</i>)	F91, F92, G01, G02	EU HD Annex VI, WA
Fauna	Pine Marten (<i>Martes martes</i>)	F91, F92, G01, G02	EU HD Annex V, WA
Fauna	Eurasian Badger (<i>Meles meles</i>)	F91, F92, G01, G02	WA

Species Group	Species name	Hectad	Conservation status
Fauna	Red Deer (<i>Cervus elaphus</i>)	F91, F92, G01, G02	WA
Fauna	West European Hedgehog (<i>Erinaceus europaeus</i>)	G01	WA
Fauna	Irish Hare (<i>Lepus timidus subsp. hibernicus</i>)	F91, F92, G01, G02	EU HD Annex V, WA
Flora	Fir Clubmoss (<i>Huperzia selago</i>)	F91, G02	EU HD Annex V
Flora	Marsh Saxifrage (<i>Saxifraga hirculus</i>)	G02	EU HD Annex II, IV
Flora	Slender Naiad (<i>Najas flexilis</i>)	G02	EU HD Annex II, IV
Flora	Wood's Whipwort (<i>Mastigophora woodsii</i>)	F91	FPO
Flora	Birds-foot Earwort (<i>Scapania ornithopodioides</i>)	F91	FPO
Flora	Lindenberg's Featherwort (<i>Adelanthus lindenbergianus</i>)	F91	FPO
Flora	Varnished Hook-moss (<i>Hamatocaulis vernicosus</i>)	F91, F92	EU HD Annex II, FPO
Flora	Three-ranked Hump-moss (<i>Meesia triquetra</i>)	F92	FPO
Flora	Large White-moss (<i>Leucobryum glaucum</i>)	F91, G02	EU HD Annex IV
Flora	Tufted Fen-moss (<i>Paludella squarrosa</i>)	G02	FPO

Note: * EU HD = European Union Habitats Directive, WA = Wildlife Acts, FPO= Flora Protection Order.

Table 7-7: Third Schedule Invasive Species

Species name	Hectad	Invasive level
Giant-rhubarb (<i>Gunnera tinctoria</i>)	F92	High Impact Invasive Species
Japanese Knotweed (<i>Fallopia japonica</i>)	F92, G01	High Impact Invasive Species
<i>Rhododendron ponticum</i>	F92, G01, G02	High Impact Invasive Species
Fallow Deer (<i>Dama dama</i>)	G01	High Impact Invasive Species (and protected under the Wildlife Acts)
American Mink (<i>Mustela vison</i>)	F92	High Impact Invasive Species

7.7.1.3 National Biodiversity Data Centre Bat Landscapes Tool

The NBDC Bat Landscapes tool was utilised to determine the bat species recorded in the hectads which encompass the proposed development site. The Bat Landscapes Tool map is based on a habitat suitability index of the surrounding landscape for each bat species. The index ranges from 0 to 100, with 0 being least favourable and 100 most favourable for bats. The bat suitability index calculations are done on a 5km² scale and therefore values within the tables for each hectad show the average landscape suitability index of the 5km² squares. The results of the Bat Landscape Tool are also shown in Table 7-8 below. The landscape suitability for all bats was 9.44 which is considered Low Suitability.

Table 7-8: Landscape Suitability Index for Bats Surrounding the Proposed Development

Species name	Landscape Suitability Index
All Bats	9.44
Soprano Pipistrelle (<i>Pipistrellus pygmaeus</i>)	29
Brown long-eared bat (<i>Plecotus auritus</i>)	12
Common Pipistrelle (<i>Pipistrellus pipistrellus</i>)	17
Lesser Horse-shoe bat (<i>Rhinolophus hipposideros</i>)	0
Leisler's bat (<i>Nyctalus leisleri</i>)	14
Whiskered bat (<i>Myotis mystacinus</i>)	0
Daubenton's bat (<i>Myotis daubentonii</i>)	11
Nathusius' pipistrelle (<i>Pipistrellus nathusii</i>)	0
Natterer's bat (<i>Myotis nattereri</i>)	2

7.7.1.4 Aquatic Environment

7.7.1.4.1 Surface Water (WFD)

The proposed development is located within the Moy & Killala Bay (34) and Blacksod-Broadhaven (33) WFD Catchments, reaching out to the Cloonaghmore_SC_010 (34_13), Deel[Crossmolina]_SC_010 (34_14), Owenmore[Mayo]_SC_020 (33_4) and Owenmore[Mayo]_SC_010 (33_1) WFD sub catchments.

The hydrological pathway from the proposed development includes 16 WFD river water bodies, two WFD lake water bodies and two WFD transitional water bodies (Figure 7-2). A search has been undertaken to the EPA Unified GIS Application³⁰ and the EPA Catchments database³¹ was conducted for these surface water bodies that form the hydrological pathway from the proposed development and their WFD water quality status for 2016-2021 (Table 7-9).

The overall excellent water quality of the WFD surface water bodies forming the proposed development's hydrological pathway is observable in Table 7-9, with the exception of the Conn (IE_WE_34_406b) WFD lake water body and Deel (Crossmolina)_060 (IE_WE_34D010400) WFD river water body, located approximately 11km from the proposed development, and the Shanvolahan_010 (IE_WE_34S010400) WFD river water body, which drains the south-eastern section of the proposed development (Figure 7-2).

Table 7-9: WFD Surface Water Bodies within Proposed Development's Hydrological Pathway.

Water Body Code	Water Body Name	WFD Water Quality Status (2016-2021)
WFD River Water Bodies		
IE_WE_33M010100	MUING_010	Good
IE_WE_33O040050	OWENMORE (MAYO)_010	High
IE_WE_33O040200	OWENMORE (MAYO)_020	High
IE_WE_33O040250	OWENMORE (MAYO)_030	High
IE_WE_33O040270	OWENMORE (MAYO)_040	High
IE_WE_33O040325	OWENMORE (MAYO)_050	Good
IE_WE_33O040500	OWENMORE (MAYO)_060	Good
IE_WE_34C030100	CLOONAGHMORE_020	Good
IE_WE_34C030150	CLOONAGHMORE_030	High
IE_WE_34C030200	CLOONAGHMORE_040	Good
IE_WE_34C030270	CLOONAGHMORE_050	Good
IE_WE_34C030300	CLOONAGHMORE_060	Good
IE_WE_34D010120	DEEL (CROSSMOLINA)_040	Good
IE_WE_34D010300	DEEL (CROSSMOLINA)_050	Good

³⁰ EPA Appropriate Assessment tool: <https://gis.epa.ie/EPAMaps/AAGeoTool>

³¹ <https://www.catchments.ie/guide-water-framework-directive/>

Water Body Code	Water Body Name	WFD Water Quality Status (2016-2021)
IE_WE_34D010400	DEEL (CROSSMOLINA)_060	High
IE_WE_34S010400	SHANVOLAHAN_010	Moderate
WFD Lake Water Bodies		
IE_WE_33_1912	Dahybaun	High
IE_WE_34_406b	Conn	Good
WFD Transitional Water Bodies		
IE_WE_390_0100	Tullaghan Bay	Good
IE_WE_420_0100	Cloonaghmore Estuary	High (2013-2018)

7.7.1.4.2 Groundwater

The proposed development is located within the Bellmullet (IE_WE_G_0057) and Bellacorick-Killala (IE_WE_G_0041) WFD ground water bodies (See Figure 7-2), both of which have been assigned 'Good' ground water status (2016-2021)³².

The description of these two ground water bodies (GWB) have been summarised using data obtained from the Geological Survey Ireland (GSI) website³³.

Bellmullet GWB³⁴:

- The northern, western and southern boundaries of the GWB are bounded by coastline. The eastern boundary of the GWB is an upland area dividing water draining to the west to the Atlantic from water draining east to Killala Bay and L. Conn. The land surface is characterised by steep slopes and mountainous terrain (Nephin Beg range) in the central portion of the GWB, flattening to the east and west.
- The GWB is composed primarily of low transmissivity rocks. Most of the groundwater flux is in the uppermost part of the aquifer: comprising a broken and weathered zone typically less than 3m thick; and a zone of interconnected fissuring typically less than 15m.
- Groundwater flow is expected to be concentrated in fractured and weathered zones and in the vicinity of fault zones.
- Recharge occurs diffusely through the subsoils and via outcrops. Recharge is limited by the peat and the low permeability bedrock, thus most of the available recharge discharges rapidly to nearby streams.
- Flow paths are likely to be short (30-300 m) with groundwater discharging rapidly to nearby streams and small springs and flow directions are expected to follow topography.
- Groundwater discharges rapidly to nearby small streams, lakes, small springs and seeps. Overall flow direction is west toward the coast.

³² EPA Appropriate Assessment tool: <https://gis.epa.ie/EPAMaps/AAGeoTool>

³³ Ground Water Bodies GSI: <https://www.gsi.ie/en-ie/programmes-and-projects/groundwater/activities/understanding-ireland-groundwater/Pages/Groundwater-bodies.aspx>

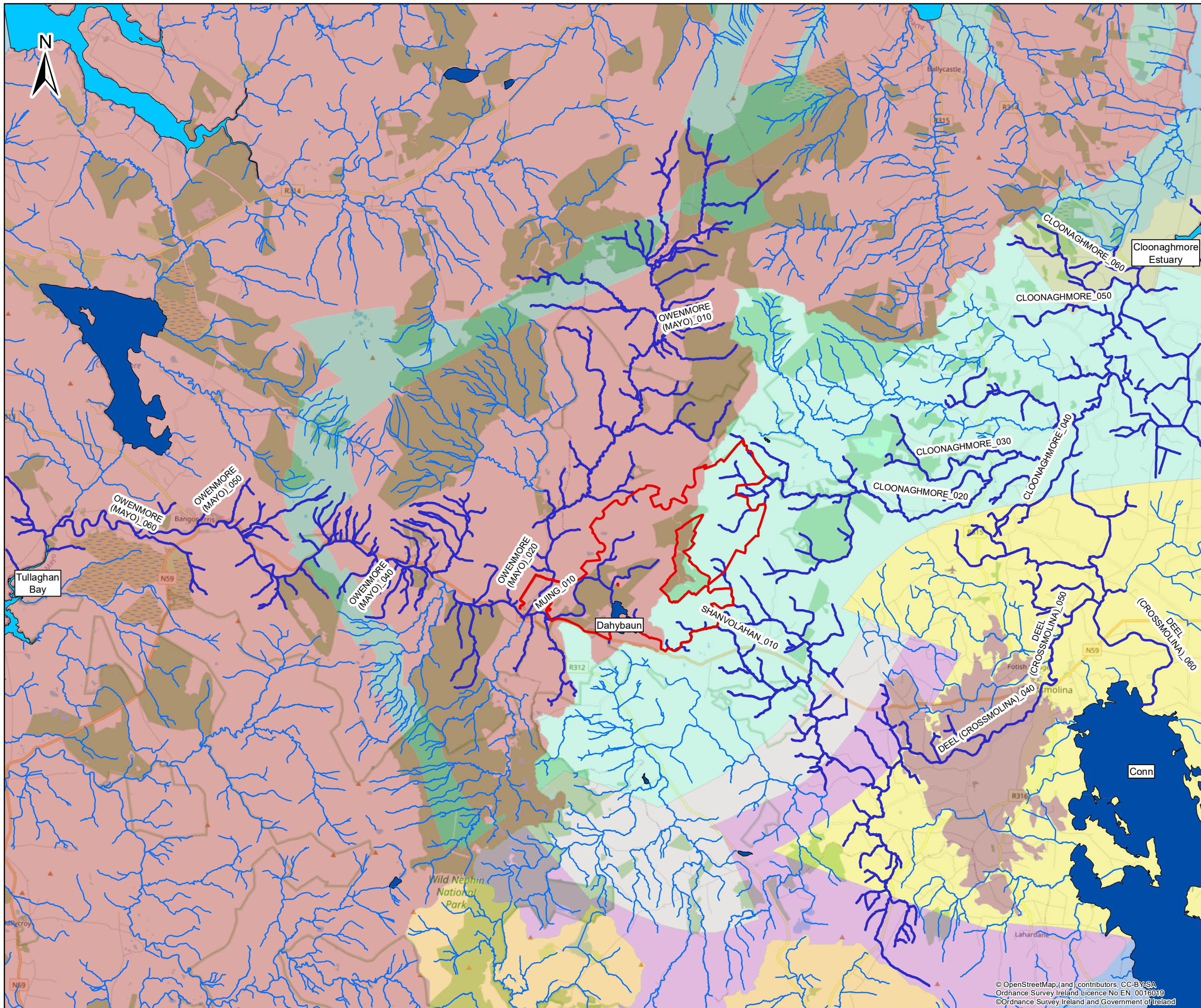
³⁴ GSI (2004), Bellmullet GWB: Summary of Initial Characterisation. *1st Draft Bellmullet GWB Description July 2004* <https://gsi.geodata.gov.ie/downloads/Groundwater/Reports/GWB/BellmulletGWB.pdf>

- The rock units in GWB are generally of low permeability and baseflow to rivers and streams is likely to be relatively low.

Bellacorick-Killala GWB³⁵:

- The GWB comprises a relatively low-lying area between Bellacorick and Killala. Elevations range from sea level to 230mAOD.
- The western boundary and part of the northern comprise an upland area that acts as surface water catchment divide and include the catchment boundary with hydrometric area 33. The eastern boundary is bounded by the coastline. The eastern section of the northern boundary and the southern boundary comprise the Ballina, Deel and Killala South GWB's.
- The GWB is composed primarily of low transmissivity rocks. Most of the groundwater flux is likely to be in the uppermost part of the aquifer: comprising a broken and weathered zone typically less than 3m thick; a zone of interconnected fissuring 10-15m; and a zone of isolated, poorly connected fissuring typically less than 150m.
- Recharge occurs diffusely through the subsoils and rock outcrops. Recharge is limited by the peat and the low permeability bedrock, thus most of the available recharge discharges rapidly to nearby streams and small springs.
- The groundwater has a calcium bicarbonate (Ca HCO₃) signature.
- Groundwater flow occurs near the surface (10-15 m), although deep water strikes have been observed. The water table is from 1-9 m below ground level and follows topography. Flow paths are likely to be up to 300 m, with groundwater discharging rapidly to nearby streams and small springs. Overall flow direction is in a westerly direction.
- The rock units in GWB are generally of low permeability and baseflow to rivers and streams is likely to be relatively low.

³⁵ GIS (2004), Bellacorick-Killala GWB: Summary of Initial Characterisation. *1st Draft Bellacorick-Killala GWB Description July.2004.*
<https://gsi.geodata.gov.ie/downloads/Groundwater/Reports/GWB/BellacorickKillalaGWB.pdf>



Legend

- Planning Application Boundary
- Rivers Connected to the Proposed Development Site
- Non-Connected Rivers
- WFD - Lakes
- WFD - Transitional Waterbodies
- WFD - Ground Waterbodies
 - Ballina
 - Bangor
 - Bellacorick-Killala
 - Belmullet
 - Beltra Lough North
 - Crossmolina Gravels
 - Deel
 - Killala North
 - Killala South
 - Laherdaun
 - Malranny

0 1 2 3 4
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NOTES

- FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
- ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
- ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
- ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
D02	22/03/2023	Draft issue	S.P.	J.D.
D01	01/02/2023	Draft issue	S.P.	J.S.

Client: **Bord na Móna**

Project: **Oweninny Wind Farm Phase 3**

Title: **Figure 7-2: WFD Surface and Ground Waterbodies**

Scale @ A3: 1:115,000

Prepared by: S.Pezzetta Checked: J.Sherry Date: March 2023

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7.7.2 Field Survey Results

The findings of the ecological surveys undertaken from 2020 to 2022 are detailed hereunder.

7.7.2.1 Habitats

A general description of the habitats and vegetation types within the entire proposed development site is presented. This is followed by descriptions for the turbine locations and the various associated infrastructure. The habitats within the proposed development site have been mapped and are illustrated in Figure 7-3 and Appendix 7.1.

7.7.2.1.1 Summary of Habitats on Site

In general, the proposed development site is dominated by cutover blanket bog which was harvested commercially between the 1950s and the early 2000s. In addition to the cutover bog there are a large number of remnant bog areas which lie scattered throughout the site. Although these remnant areas are dominated by lowland blanket bog, they also contain areas of dry heath and wet heath and patches of transition mires and quaking bog. Various lakes and ponds, some of recent origin, occur scattered through the proposed development site. In the western and central areas of the site there are a number of areas dominated by commercial conifer plantation on peat. A description of the principal habitats which occur on the site, with a summary in

Table 7-10, where applicable, the corresponding Annex I habitat category of the EU Habitats Directive is given.

Habitats were classified according to Fossitt (2000)⁸ during the general ecological walkover surveys of the site. The habitats within the proposed development footprint are described below and shown in Figure 7-3 below.

Table 7-10: Summary of habitats recorded onsite, including corresponding Annex I habitats where relevant.

Habitat Type (Fossitt)	EU Habitats Directive
Dystrophic lakes (FL1)	Natural dystrophic lakes and ponds (3160)
Acid oligotrophic lakes (FL2)	Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> (3130)
Artificial lakes (FL8)	-
Eroding/upland rivers (FW1)	-
Depositing/lowland rivers (FW2)	-
Drainage ditches (FW4)	-
Calcareous springs (FP1)	*Petrifying springs with tufa formation

Habitat Type (Fossitt)	EU Habitats Directive
	(<i>Cratoneurion</i>) (7220)
Improved grassland (GA1)	-
Amenity grassland (improved) (GA2)	-
Dry meadows and grassy verges (GS2)	-
Dry-humid acid grassland (GS3)	-
Wet grassland (GS4)	-
Dry siliceous heath (HH1)	-
Wet heath (HH3)	Northern Atlantic wet heaths with <i>Erica tetralix</i> (4010)
Lowland blanket bog (PB3)	Blanket bogs (* if active bog) (7130)
Cutover blanket bog (PB4)	-
Poor fen and flush (PF2)	-
Transition mire and quaking bog (PF3)	Transition mires and quaking bogs (7140)
Bog Woodland (WN7)	-
Conifer plantation (WD4)	-
Scrub (WS1)	-
Immature Wood (WS2)	-
Recently Felled Woodland (WS5)	-
Exposed sand, gravel, or till (ED1)	-
Buildings and artificial surfaces (BL3)	-

* Indicates Annex I habitat with priority status

Dystrophic Lakes (FL1)

Dystrophic lakes, which usually have a sharply defined, peaty, lake edge, occur within some of the bog remnant areas within the proposed development site. There is generally little associated vegetation in these lakes apart from some sparse pondweed (*Potamogeton* spp) and some common reed (*Phragmites australis*) along the margins.

Most of the best examples of dystrophic lakes within the survey area are found near the wettest central areas of the larger bog remnants to the east of the proposed development site. It is often difficult to separate this lake type from acid oligotrophic lakes, which generally have a stony lake shore. Some of these lakes correspond to the Annex I habitat “natural dystrophic lakes and ponds (3160)” due their physical characteristics, such as brown tinted water, peaty substrates and low pH, also indicator plants such as white beaked sedge (*Rhynchospora alba*) and several *Sphagnum* species (EC, 2013)⁹.

The dystrophic lakes onsite were assessed as being of Local (Higher Value) to National Importance.



Photo 7-1: Dystrophic Lake (FL1)

Acid Oligotrophic Lakes (FL2).

A number of small, lowland oligotrophic lakes occur throughout the site. These generally lie within the blanket bog remnant areas. Although it can be difficult to distinguish the lake type from dystrophic lakes, the fringing vegetation is usually better developed. Fringing vegetation on the recorded lakes were sparse and confined to narrow bands of bottle sedge (*Carex rostrata*) swamp with occasional stunted willows. Additional swamp species which grow along the shallow water of the margins include water horsetail (*Equisetum fluviatile*), bog bean (*Menyanthes trifoliata*) and common reed (*Phragmites australis*), though extensive areas of swamp dominated by these species is rare.

Lough Dahybaun SAC is an excellent example of an acid, oligotrophic lake and contains a population of the legally protected (Flora Protection Order) and Annex II listed plant species slender Naiad (*Najas flexilis*). This rare aquatic plant was recorded at the site in 1987 and 1995. Slender Naiad occurs in association with a range of other aquatic and emergent species. No slender naiad was recorded in 2020 but other species recorded included common reed, bulbous rush (*Juncus bulbous*), bottle sedge, bulrush (*Typha latifolia*), yellow water-lily (*Nuphar lutea*), pondweed species (*Potamogeton* spp.), water horsetail (*Equisetum fluviatile*). These lakes

correspond to the Annex I habitat “oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* (3130)”.

Acid oligotrophic lakes within the proposed development range from Local (Higher Value) to International Importance.



Photo 7-2: Acid Oligotrophic Lake (FL2), Lough Dahybaun

Artificial Lakes (FL8)

In the cutover bog areas of the proposed development site there are a number of substantial open water areas which have developed in low-lying depressions with poor drainage or have been developed from long term siltation areas developed under the site rehabilitation programme post peat production.

These lakes are a by-product of peat harvesting and they are not considered to be examples of natural dystrophic pools. The water levels within these “lakes” fluctuate markedly throughout the year and often there is little or no associated swamp/wetland vegetation along the lake margins.

These artificial lakes within the proposed development are of Local importance (Lower Value).

Eroding/upland Rivers (FW1)

Most of the river channels within the site are narrow, i.e. <5 metres wide, are typically first orders and are best described as eroding/upland rivers. In many areas these rivers have been widened and substantially deepened in the past in order to facilitate better drainage of the adjoining cutover bog areas. In general, there is little growing vegetation within the river channels apart from small patches of bulbous rush (*Juncus bulbosus*) and various pondweeds (*Potamogeton* sp.). Along the river margins the vegetation is characterised by wet grassland vegetation in which soft rush (*Juncus effusus*) dominates, with purple moor grass (*Molinia caerulea*) dominant in peat areas. Occasional shrubs of willow (*Salix aurita*) and gorse (*Ulex europaeus*) also occur.

The upland/eroding rivers within the proposed development site are of County Importance, as they provide spawning and nursery habitats for the Annex II species; salmonids, crayfish and lamprey (based on aquatic survey results [see section 7.7.2.3]). These rivers also form tributaries to larger watercourses located offsite, including the Oweninny River (an important salmon river) and the River Deel, which contains a population of freshwater pearl mussel (*Margaritifera margaritifera*).

Depositing/Lowland Rivers (FW2)

Two rivers channel within the proposed development site were slow flowing and had riverbeds indicating that deposition was occurring, they included the River Muing to the west of the site and Fiddaunatooghaun watercourse near the southeast of the site. These watercourses contained little to no instream vegetation.

These lowland/depositing rivers within the site are assessed as being of County Importance, as they provide spawning and nursery habitats for Annex II species; salmonids, crayfish and lamprey (based on aquatic survey results [see section 7.7.2.3]). These rivers also form tributaries to larger watercourses located offsite including the Oweninny River (an important salmon river) and the River Deel which has a population of freshwater pearl mussel (*Margaritifera margaritifera*).

Drainage Ditches (FW4)

Drainage ditches occur over much of cutover bog within the proposed development site. The drainage ditches were excavated as part of peat extraction and are now generally less than 1m in depth. Throughout the proposed development site, most of the drains have been blocked with

peat dams as part of a bog rehabilitation programme³⁶. The main rehabilitation took place between 2003-2007. In areas where peat harvesting continued up until its cessation in 2003 there is little or no associated ditch vegetation. In more vegetated areas of cutover bog however most drains are colonized by species such as soft rush, common bog-cotton (*Eriophorum angustifolium*), bog pondweed (*Potamogeton polygonifolius*), jointed rush (*Juncus articulatus*), bulbous rush (*Juncus bulbosus*) and the mosses *Sphagnum cuspidatum* and *Polytrichum commune*.

These drainage ditches were assessed as being of Local Importance (Lower Value) as they were typically low in species diversity or not connected to other aquatic habitats.

Calcareous Springs (FP1)

One small area of calcareous spring habitat with tufa formation occurs beside an old railway bed in cutaway bog in the south-eastern corner of the proposed development site. The area contains a large open section of calcareous deposit which has a low vegetation cover. The spring vegetation surrounding this open calcareous section is dominated by mounds of the moss *Philonotis calcarea* with frequent marsh horsetail (*Equisetum palustre*), colt's foot (*Tussilago farafara*), black bog-rush (*Schoenus nigricans*) and common reed (*Phragmites australis*).

This area of habitat corresponds to the priority Annex I habitat "petrifying springs with tufa formation (*Cratoneurion*) (7220) as defined in (EC, 2013)⁹. This is considered a good example of this rare habitat and was assessed as having National Importance.

³⁶ https://epawebapp.epa.ie/licences/lic_eDMS/090151b2804d366a.pdf



Photo 7-3: Calcareous Spring (FP1), note the calcium deposits visible on surface in foreground

Improved Grassland (GA1) and Amenity Grassland (improved) (GA2)

Improved agricultural grassland comprises a very small area of the overall proposed development site. A small area of the habitat can be found along the grid connection route to the north of the existing Bellacorick substation and a small area located in the east of the proposed development site. The vegetation is generally dominated by agricultural grasses such as, perennial ryegrass, Yorkshire fog (*Holcus lanatus*), bent grasses (*Agrostis* sp.), sweet vernal grass (*Anthoxanthum odoratum*), *Poa* sp. (meadow grasses) and forbs such as white clover (*Trifolium repens*) and ribwort plantain (*Plantago lanceolata*).

A small area of amenity grassland, in the form of a lawn, was recorded near the existing Bord na Móna buildings to the south of the site. The maintained lawn was species poor with perennial ryegrass and meadow grasses dominant.

The improved grassland and amenity grassland within the proposed development site were both assessed as being of Local importance (Lower Value), due to the low species diversity and low ecological value the habitats provide.

Dry Meadows and Grassy Verges (GS2)

Throughout the proposed development site there is an extensive network of disused railway tracks. These railway track embankments were constructed with stone and over time a relatively grassy vegetation has developed along the track margins. The most frequent and conspicuous species occurring are glaucous sedge (*Carex flacca*), common bent (*Agrostis capillaris*), ribwort plantain (*Plantago lanceolata*), annual meadow-grass (*Poa annua*) and colts foot.

The dry meadows and grassy verge habitats within the proposed development site, were assessed as being of Local Importance (Lower Value) due to the low species diversity the habitats provides.

Dry-humid Acid Grassland (GS3)

Small areas of dry-humid acid grassland occur scattered throughout the proposed development site. The habitat is usually associated with freely draining soil occurring on glacial till and many of these areas have small, disused quarries associated with them. The vegetation within this habitat was dominated by common bent (*Agrostis capillaris*), mat grass (*Nardus stricta*), sheep's fescue (*Festuca ovina*), other occasional plants included tormentil (*Potentilla erecta*) and the mosses *Rhytidiadelphus squarrosus* and *Hylocomium splendens*.

The dry-humid acid grassland habitats within the proposed development site, were assessed as being of Local Importance (Higher Value) based on their moderate species diversity and scarcity within the wider area.



Photo 7-4: Acid Grassland (GS3)

Wet Grassland (GS4)

Wet grassland occurred across much of the proposed development site. The habitat ranged from river margins to areas of reclaimed blanket bog in the south of the site. In all areas where it was recorded, the vegetation was dominated by soft rush, with creeping buttercup (*Ranunculus repens*), and the moss pointed spear-moss (*Calliergonella cuspidata*) frequent.

The wet grassland habitat found throughout the proposed development site was assessed as being of Local Importance (Lower Value), as much of these areas had little species diversity.

Dry Siliceous Heath (HH1)

Species-poor dry heath, dominated by ling (*Calluna vulgaris*), was recorded at two areas within the proposed development site, one along the northern shore of Lough Daybaun and the second on a low hill to the east. Other frequent species recorded within the vegetation include purple moor grass, while other species such as bell heather (*Erica cinerea*) and the mosses heath plait-moss (*Hypnum jutlandicum*) and waved silk-moss (*Plagiothecium undulatum*), were recorded occasionally. Small areas of developing dry heath dominated by ling are also found in drier areas of cutover bog and on dry banks along the margins of blanket bog remnants. The dry heath present on site does not correspond to the Annex I habitat European dry heaths (4030) (even

though this Annex I habitat is also known to occur in the wider area), due to the lack of indicator species such as gorse (*Ulex* spp.) or *Vaccinium* spp or higher numbers of others dwarf shrubs such as bell heather.

The dry siliceous heaths found within the proposed development site were assessed as being of Local Importance (Higher Value).



Photo 7-5: Dry Siliceous heath (HH1)

Wet Heath (HH3)

In terms of overall floristic composition wet heath is quite similar to dry heath. In areas where wet heath was recorded, purple moor grass was dominated with cross leaved heath (*Erica tetralix*), deer grass (*Trichophorum cespitosum*) and various sphagnum mosses also conspicuous. In common with dry heaths onsite, areas of wet heath occurred in areas of relatively shallow peat cover or along the margins of bog remnants where there has been recent drainage. Some areas of this habitat have evidence of historic drainage or showing signs of heavy grazing from sheep, while other areas present correspond to the Annex I habitat Northern Atlantic wet heaths with *Erica tetralix* (4010) as per (EC, 2013)⁹.

The wet heath habitats found within the proposed development site were assessed as being of Local Importance (Higher Value) in areas of drained or grazed habitat or National importance

where the habitat corresponded to the Annex I habitat Northern Atlantic wet heaths with *Erica tetralix*. This Annex I habitat is also known to occur in the wider surrounding area.



Photo 7-6: Wet Heath (HH3)

Lowland Blanket Bog (PB3)

Throughout the proposed development site there are blanket bog remnants which were not subject to peat extraction in the past. A total of 49 remnants have been identified and their distribution shown in Figure 7-3. Some of these remnants remained untouched by Bord na Móna as they were unsuitable for development under the peat extraction method at the time. Others are intact but had been ditched and drained in preparation for peat exploitation (which never occurred). Some of these had the surface vegetation removed but good recovery has since occurred. As part of the bog rehabilitation programme, most of the drainage networks on these bogs have been blocked in order to restore the hydrology of the remnant. Most of the remnants are relatively small in size (< 20 ha) but there are several larger ones between 20 and 50ha.

The calculated total area of the bog remnants (equating to lowland blanket bog) on site is 387.2 ha. The peat depth within the bog remnants is generally between 1 and 4m and they are now mostly surrounded by cutover bog – this gives many of them a ‘perched’ appearance.

The dominant plant species in the vegetation are purple moor-grass and ling, with cross-leaved heath, black bog-rush (*Schoenus nigricans*), bog asphodel (*Narthecium ossifragum*) and deergrass conspicuous in the more intact areas. The main bryophyte species recorded were

Sphagnum capillifolium, *Sphagnum papillosum*, *Hypnum jutlandicum* and *Racomitrium lanuginosum*, with the lichen species *Cladonia portentosa* and *Cladonia uncialis* also locally frequent. The central areas of the larger remnants are more hydrologically intact and here bog pools and small dystrophic lakes are often present. These typically contain species such as bog bean (*Menyanthes trifoliata*), common bog-cotton (*Eriophorum angustifolium*) and the aquatic moss *Sphagnum cuspidatum*. Central areas of the undrained blanket bog remnants are usually wet and have a high cover of *Sphagnum* mosses, the marginal areas of blanket bog remnants are often quite dry and modified, as a result of drainage effects from the surrounding cutover bog. Blanket bog remnants with a relatively intact hydrology correspond to the Annex I habitat blanket bogs (* if active bog) (7130). Many of the bog remnant areas contain substantial drains which have lowered the water table. Most of these drains have been blocked with peat dams in recent years.

Of the 49 areas of lowland blanket bog within the site, the majority were assessed as being of Local Importance (Lower Value) as they are generally small in size, had lost their hydrological integrity due to past drainage works or were completely surrounded by cutover bog with no connection to other areas of blanket bog.

Other areas (mostly to the north west of the site) were assessed as Local Importance (Higher Value) as these were medium in size, had evidence of historic drainage which could benefit from peat dam blocking or had connection to other higher quality bogs.

The majority of the blanket bog areas located along the north-eastern and eastern edges of the proposed development site boundary, are large (a total area of approx. 160ha), some of these areas have experienced past drainage but much of the drains have been blocked in recent years and are showing signs of bog flora regeneration, other areas have avoided past peat extraction activities and have well developed blanket bog vegetation. These areas along the north-eastern and eastern edges of the site boundary, are directly adjacent to the Bellacorick Bog Complex SAC, where high quality open bog habitat can be seen. For these reasons these areas of lowland blanket bog have been assessed as being of National Importance.



Photo 7-7: Large area of National Importance Lowland Blanket Bog (PB3), near eastern boundary of the proposed development which is connected to adjacent Bellacorick Bog Complex SAC.



Photo 7-8: Area of Local (Higher Value) Importance Lowland Blanket Bog (PB3). Area has evidence of past drainage, giving a drier appearance and less species diversity.

Cutover Bog (PB4)

The proposed development site is dominated by cutover bog which is the result of industrial-scale peat extraction since the 1950's. This extensive peat extraction has resulted in the presence of a variable peat cover within the proposed development site which, in turn, has resulted in a varying patchwork of plant recolonization. The main recolonizing vascular plant species recorded were soft rush, common bog cotton and bulbous rush. The moss species recorded were *Polytrichum commune* and *Campylopus introflexus*, with *Hypnum jutlandicum* and *Sphagnum capillifolium* also locally common in areas where revegetation of cutover is more advanced. Areas of cutover which remain wet for much of the year often have a high cover of soft rush and *Sphagnum cuspidatum*.

Past peat extraction has resulted in the presence of undulating peat surfaces which are separated by wide drains. The degree of plant recolonization evident depends to a large extent on the length of time since peat extraction. Over large areas bare peat surface dominates with occasional clumps of soft rush and common bog cotton scattered throughout, while in other areas where peat extraction ceased at an earlier time the vegetation cover comes close to 100% with soft rush and *Polytrichum commune* the typical dominant species.

In many of the low areas within the proposed development site the peat layer has been excavated down to the till/subsoil and varying mixtures of soft rush and *Polytrichum commune* have colonized growing in association with extensive areas of bare peat and gravel. Where substantial areas of bare gravels occur, these can be assigned to the habitat 'Exposed sand, gravel or till (ED1)'. As outlined previously there are areas in which pioneer dry heath vegetation dominated by ling heather has occurred. Another characteristic seen in some of the older cutover areas is the high frequency of immature, self-seeded lodgepole pine (*Pinus contorta*) trees. In areas where these have been left to develop the habitat is progressing into immature pine woodland (discussed further below on 'Immature woodland (WS2)').

Throughout the proposed development site most of the drains within areas of cutover blanket bog have been blocked with large peat dams in order to slow drainage within the site and to encourage the regeneration of wetland vegetation. Bare peat surface with a very sparse vegetation cover accounts for some of the areas that were still in peat production up until 2003, particularly where relatively deeper depths of peat remain at Oweninny.

The cutover bog recorded onsite is of varying quality. Much of it has developed relatively recently and has been encouraged by the Bord na Móna bog rehabilitation programme which was initiated in the early 2000's. At present, much of the cutover bog area is rated as Local Importance (Lower Value) due to the low ecological value of the habitat. However, in some areas

(where peat extraction ceased earlier) vegetation regeneration has developed enough to cover the peat, leaving very few bare areas. These have also remained wet as a result of drain blocking and are typically found near remnant blanket bog areas. As a result, these areas of cutover bog are assessed as having Local importance (Higher Value).



Photo 7-9: Area of regenerating Cutover Bog (PB4) assessed as being of Local Importance (Higher Value).



Photo 7-10: Aerial image of large area of Cutover Bog (PB4) to eastern edge of proposed development site, note the large areas of bare peat and sparse vegetation.

Poor Fen and Flush (PF2)

A number of small poor flushes and wetland areas are located within the proposed development site, mostly confined to the western and north eastern areas. Some of these areas correspond to former lakes on the 6inch OSI maps and others are located within recolonising cutover bog (PB4) habitat. These poor flush areas have a low conductivity and neutral pH. Conductivity measurements in August 2021 indicated conductivity of <math><90\text{uS/cm}</math> and pH 6.8 to 7.2. The vegetation at all these sites were dominated by soft rush, common bog cotton and common haircap. Other frequently encountered species included jointed rush, marsh pennywort (*Hydrocotyle vulgaris*) and bog bean.

The poor fen habitat was assessed as being of Local Importance (higher Value).

Other poor flushes are known to occur within proximity to the proposed development site boundary, notably within the Bellacorick Bog Complex SAC, which is directly adjacent to the site boundary.



Photo 7-11: Poor Fen and Flush (PF2)

Transition Mire and Quaking Bog (PF3)

A small area of transition mire and quaking bog was recorded within the proposed development site boundary, approximately 990m to the northeast of Lough Dahybaun. This area was noted as being very wet and quaking underfoot. It is occurring between areas of wet heath (HH3) and lowland blanket bog (PB3). The vegetation was dominated with cotton grass species and purple moor grass, with black bog rush (*Schoenus nigricans*), sphagnum species, bog bean (*Menyanthes trifoliata*) and white beaked sedge (*Rhynchospora alba*) also occurring. This habitat corresponds to the annexed habitat, 'transition mires and quaking bogs (7140).

This transition mire and quaking bog habitat found within the site was assessed as being of National Importance as the entirety of the area corresponded to the Annex I habitat transition mires and quaking bogs as per (EC, 2013)⁹. This Annex I habitat is also known to occur in the wider area and adjacent SACs.



Photo 7-12: Transition Mire and Quaking Bog (PF3)

Bog Woodland (WN7)

A small stand of bog woodland can be found to the far northeast corner of the proposed development site. The wood is dominated by willow (*Salix* spp.), with downy birch (*Betula pubescens*) occurring frequently. The ground was noted as being very waterlogged with some small pools present, likely attributed to occurring on/near an area of lowland blanket bog (PB3) to the south of the wood and wet regenerating cutover bog (PB4) to the north. An extensive dwarf shrub layer of ling and bog myrtle along with a ground layer dominated with purple moor grass could be found under the canopy. This bog woodland was assessed as Local importance (Higher Value), and it does not correspond with any Annex I habitats due to the lack of indicator traits (i.e. habitat was not dominated by downy birch and a low cover of sphagnum species were recorded) as per (EC, 2013)⁹.

Conifer Plantation (WD4) and Recently Felled Woodland (WS5)

Coniferous plantations occur mainly in the south-western section of the proposed development site, with one large stand located close to the northern boundary of the site. These were planted mainly in the 1980s and are now closed canopy. The main tree species are Sitka spruce and lodgepole pine. All the areas of forest recorded had little or no ground flora present due to shading and needle litter deposition. In areas where the trees have not grown well or where there are gaps, a modified blanket bog/wet heath ground flora may still occur, with purple moor grass and ling the main species present.

An area of recent clear felled conifer plantation was also recorded. These trees were removed in early 2020. This area contained little to no flora following the removal of the trees.

The conifer plantation and recently felled woodland habitats were assessed as being of Local Importance (Lower Value) due to the low species diversity and low ecological value the habitats provide.

Scrub (WS1)

Scrub occurs scattered across the cutover bog habitat, though it is not particularly dominant in any area. Willows (*Salix aurita* and *Salix cinerea*) are the principal species though gorse and brambles (*Rubus fruticosus*) also occur. As already noted, self-seeded lodgepole pine saplings are contributing to a scrub canopy in some areas of the cutover bog.

The scrub habitat was assessed as being of Local Importance (Higher Value) due to the moderate ecological value the habitats provides and its rarity within the greater area.

Immature Woodland (WS2)

Small areas of immature wood mainly confined to the centre of the proposed development site and associated with cutover bog were recorded. These woods were dominated by self-seeded lodgepole pine with a dense understory and ground layer of soft rush, sphagnum spp. and Yorkshire fog (*Holcus lanatus*).

The immature lodge pole pine woodland habitats were assessed as being of Local Importance (Lower Value) due to the low species diversity and low ecological value the habitats provide.



Photo 7-13: Immature Woodland (WS5) of self-seeded lodgepole pine

Buildings and Artificial Surfaces (BL3)

As a result of the past use of the site for peat production tracks and buildings are scattered throughout the site. These generally hold little or no interest from an ecology point of view however the presence of relatively species-rich grassland vegetation (GS2) on old railway embankments has been noted previously.

The buildings and artificial surface habitats were assessed as being of Local Importance (Lower Value) due to the low species diversity and low ecological value the habitats provide.

7.7.2.1.2 Turbine bases and hardstands

Turbine 1 (T01)

Turbine 1 and its hardstand are located entirely in an area of cutover bog (PB4), with a wet drainage ditch (FW4) flowing through the area. The cutover bog (PB4) vegetation had signs of regeneration, with cotton grass species, being dominant on exposed peat areas. Some areas of exposed gravel and stone (ED1) were also recorded which were higher and drier than the surrounding peat. At these locations' heather species, including ling heather and cross leaved heath were frequent. Self-seeded lodge pole pines are occasionally scattered throughout the

area. There is little to no management in this area, but sheep were recorded grazing. The condition of the habitat is considered to be poor.

The drainage ditch (FW4) which flows through this area, had a low flow and was heavily vegetated. It had steep straight cut banks and a peat bed. Species encountered included soft rush, ling, jointed rush, and sedges (*Carex*spp).

The areas of cutover bog and drainage ditches recorded here are of low species diversity and ecological value and was assessed as being of Local Importance (Lower Value).

Turbine 2 (T02) and Turbine 3 (T03)

Turbines 2 and 3 and their respective hardstands are located in a mix of immature woodland (WS2) and cutover bog (PB4) with some drainage ditches (FW4) occurring also. The areas of immature woodland are made up entirely of self-seeded lodge pole pine, with an understory of soft rush, sphagnum, and heather. The trees are growing in dense patches in some areas. The areas of surrounding cutover bog (PB4) are heavily vegetated and dominated by soft rush and ling, but lodgepole pine are scattered throughout. Both the immature woodland (WS2) and cutover bog (PB4) habitats have no evidence of management and are considered to be in poor habitat condition.

Some wet drainage ditches have been recorded in the area, these are all heavily vegetated and have no flow and little areas of open water due to density of the soft rush, jointed rush and common haircap moss.

The areas of cutover bog, immature woodland and drainage ditches recorded here were of low species diversity and ecological value and were assessed as being of Local Importance (Lower Value).

Turbine 4 (T04)

Turbine 4 and its hardstand are located entirely in an area of cutover bog (PB4). The cutover bog (PB4) vegetation has signs of strong regeneration and few areas of exposed peat. Purple moor grass and ling were recorded as being dominant, with other recolonising bog species occurring also, including soft rush, tormentil, bell heather, black bog rush, sphagnum species and some sedges (*Carex*spp.). Self-seeded lodge pole pines are occasionally scattered throughout the area as well as some small willows. There is little to no management in this area, but sheep were recorded grazing.

The area of cutover bog recorded here is wet as a result of drain blocking and is found near remnant blanket bog areas, several recolonising bog species were also recorded. As a result, this area was assessed having Local importance (Higher Value).

Turbine 5 (T05)

Turbine 5 and its hardstand are located entirely in an area of cut over bog (PB4). The cut over bog (PB4) vegetation has signs of regeneration but contains a number of exposed peat areas or shallow pools. The vegetation is dominated by bog cotton, *Polytrichum commune* and soft rush. Self-seeded lodge pole pines are occasionally scattered throughout the area. There is little to no management in this area, with the exception of light sheep grazing.

The area of cutover bog habitat recorded here were of low species diversity and ecological value and was assessed as being of Local Importance (Lower Value).

Turbine 6 (T06)

Turbine 6 and its hardstand are located entirely in an area of cutover bog (PB4). The cutover bog (PB4) vegetation has signs of strong regeneration and few areas of exposed peat. Bog cotton species and ling are recorded as being dominant, with other recolonising bog species occurring also, including purple moor grass, heath rush (*Juncus squarrosus*), sphagnum species and bog asphodel. Self-seeded lodge pole pines are occasionally scattered throughout the area as well as some small willows. There is little to no management in this area, with the exception of light sheep grazing.

The area of cutover bog habitat recorded here was of low species diversity or ecological value and was assessed as being of Local Importance (Lower Value).

Turbine 7 (T07)

Turbine 7 and its hardstand are located entirely in an area of cutover bog (PB4). The cutover bog (PB4) vegetation has signs of regeneration but contains a number of exposed peat areas or shallow pools. The vegetation is dominated by bog cotton, haircap and soft rush. Self-seeded lodge pole pines are occasionally scattered throughout the area. There is little to no management in this area, with the exception of light sheep grazing.

The area of cutover bog habitat recorded here was of low species diversity and ecological value and was assessed as being of Local Importance (Lower Value).

Turbine 8 (T08)

Turbine 8 and its hardstand are located mostly in an area of cutover bog (PB4). The cutover bog (PB4) vegetation has areas of exposed gravel in sections (ED1). The vegetation is dominated by cotton grass and purple moor grass. There is little to no management in this area, but sheep were recorded grazing. The end of the hardstand is located within an area of buildings and artificial surfaces (BL3) which is made up of an abandoned access track. This section of habitat was dominated by buttercup, soft rush, dandelion and jointed rush.

The area of cutover bog and buildings and artificial surface habitats recorded here was of low species diversity and ecological value, it was assessed as being of Local Importance (Lower Value).

Turbine 9 (T09)

Turbine 9 and its hardstand are located entirely in an area of cutover bog (PB4). The cutover bog (PB4) vegetation has areas of exposed gravel in sections. The vegetation is dominated by cotton grass and purple moor grass. There is little to no management in this area, but sheep were recorded grazing.

The area of cutover bog habitat recorded here was of low species diversity and ecological value, it was assessed as being of Local Importance (Lower Value).

Turbine 10 (T10)

Turbine 10 and its hardstand are located mostly in an area of cutover bog (PB4). The cutover bog (PB4) vegetation has areas of exposed gravel (ED1) in sections. The vegetation is dominated by cotton grass and purple moor grass. There is little to no management in this area, but sheep were recorded grazing. Part of the hardstand also falls on an area of degraded lowland blanket bog (PB3) dominated by cotton grass. This habitat is in poor condition, with a lack of bog species diversity. There is past evidence of drainage and sheep grazing was recorded.

The area of cutover bog and buildings and lowland blanket bog recorded here were of low species diversity and ecological value, it was assessed as being of Local Importance (Lower Value).

Turbine 11 (T11), Turbine 13 (T13), Turbine 14 (T14) and Turbine 15 (T15)

Turbines 11, 13, 14 and 15, and their hardstands are located entirely in an area of cutover bog (PB4). The cut over bog (PB4) vegetation has signs of regeneration but contains small patches of heather and soft rush dominated areas. The vegetation is dominated by bog cotton and deer grass. There are also large areas of exposed peat throughout. There is little to no management in this area, but sheep were recorded grazing.

Some wet drainage ditches occur in the area, these are all heavily vegetated and have no flow and little areas of open water due to density of the soft rush, jointed rush and common haircap.

The areas of cutover bog and drainage ditches recorded here are of low species diversity and ecological value and were assessed as being of Local Importance (Lower Value).

Turbine 12 (T12)

Turbine 12 and its hardstand are located entirely in an area of cutover bog (PB4). The cutover bog (PB4) vegetation has some patches of bare peat. The vegetation is dominated by cotton grass. There is little to no management in this area, but sheep were recorded grazing. The hardstand also falls on top of two drainage ditches (FW4) that are heavily vegetated, dominated by cotton grass and ling heather.

The areas of cutover bog and drainage ditches recorded here are of low species diversity and ecological value and were assessed as being of Local Importance (Lower Value).

Turbine 16 (T16)

Turbine 16 and its hardstand are located mostly in an area of cutover bog (PB4). The cutover bog (PB4) vegetation has signs of regeneration but contains small patches of heather and soft rush dominated areas. The vegetation is dominated by bog cotton and deer grass. There are also large areas of exposed peat throughout. There is also a small patch of degraded lowland blanket bog that falls within the hardstand boundary which is dominated by ling heather, purple moor grass and cotton grass. There is little to no management in this area, but sheep were recorded grazing, signs of over grazing was present.

The areas of cutover bog and degraded lowland blanket bog habitat recorded here were of low species diversity and ecological value and were assessed as being of Local Importance (Lower Value).

Turbine 17 (T17) and Turbine 18 (T18)

Turbine 17 and 18, and their hardstands are located entirely in an area of cutover bog (PB4). The cutover bog (PB4) vegetation has signs of regeneration but contains small patches of heather and soft rush dominated areas. The vegetation is dominated by bog cotton and deer grass. There are also large areas of exposed peat throughout. There is little to no management in this area, but sheep were recorded grazing.

The area of cutover bog habitat recorded here was of low species diversity and ecological value, it was assessed as being of Local Importance (Lower Value).

7.7.2.1.3 Internal Roads, Turning Bays and Amenity Trackway

The network of access roads to the turbines and turning bays will partially fall on existing tracks classified as buildings and artificial surfaces (BL3), these existing roads had little vegetation or species which were common in the wider area. New tracks will be constructed on areas of cutover bog (PB4) dominated by cotton grass and purple moor grass. These areas of cutover bog show little sign of management and are sheep grazed. There will also be vegetation clearance in areas of wet grassland (GS4) and lowland blanket bog (PB3) to facilitate internal roads.

The areas of wet grassland which will be built on are all uniform in species composition and dominated by soft rush. All areas had low species diversity and wet underfoot.

Two small areas of lowland blanket bog will be cleared to provide access to turbines 6 and 14. The access track to turbine 6 will cross an area of previously drained bog, which has good species diversity, it is also connected to other larger areas of lowland blanket bog or recolonising cut over bog. The access track to turbine 14, will cross a small area of bog which has signs of past drainage, this area of bog was recorded as having a low species diversity and is nearly surrounded by poor quality cutover bog.

The proposed access tracks to turbines 14 and 16 will need to cross eroding/ upland rivers (FW1) habitats at two locations, they will be crossing the Fiddaunnamung (WFD code: IE_WE_34C030100) at two separate locations. This stream was predominantly made of riffles, with a gravel, cobble and sand bed. Suitable spawning habitat for salmon, trout and eel, were identified in this stream (based on aquatic survey results [see Site 7, section 7.7.2.3]). The proposed roads and access track will also cross/ run alongside several drainage ditches (FW4) which are dominated by wet rush, cotton grass and ling.

Based on the above, the cutover bog (PB4), buildings and artificial surfaces (BL3), drainage ditch (FW4), wet grassland (GS4) and area of lowland blanket bog (PB3) which will be crossed to

access turbine 14 were assessed as being of Local Importance (Lower Value), the small area of low land blanket bog (PB3) which will be crossed to access turbine 6 was assessed as being of Local Importance (Higher Value). The eroding/ upland rivers (FW1) that will be crossed or run alongside the roads to turbines 14 and 16 were assessed as being of County Importance.

7.7.2.1.4 Site compound, Substation and Met mast

A total of four proposed site compounds will be located across the proposed development site. Four of which are located close to the west of the site. The habitats recorded at these locations included buildings and artificial surfaces (BL3), wet grassland (GS4) and cut over bog (PB4). The areas of artificial concrete and gravel surfaces (BL3) contained a ground layer of short vegetation including ribwort plantain and dandelion, there was little to no sign of management and considered to be in very poor habitat condition. The areas of wet grassland (GS4) contained typical wet grassland species, which is dominated by soft rush, these areas contained no management. The area of cut over bog (PB4) consisted largely of exposed peat and some areas of exposed gravels/stones. Typical vegetation encountered included ling, bog cotton grasses and purple moor grass.

The remaining three proposed site compounds were located to the east of the proposed development site. The habitats here largely consisted of cutover bog (PB4), with some minor areas of scrub (WS1) and wet heath (HH3). The area of cutover bog (PB4) consisted largely of exposed peat and some areas of exposed gravels/stones (ED1) or wetter areas, where some surface water forms large shallow pool. Typical vegetation encountered included cotton grasses and purple moor grasses. These areas contained no management. The small section of wet heath (HH3) is located directly adjacent to a large expanse of cutover bog (PB4), the vegetation was dominated by purple moor grass and heather species, with a relatively low vegetation height, which is attributed to the presence of grazing sheep. A small section of scrub (WS1) consisting of willow, heather and bog myrtle is located directly adjacent to the area of wet heath (HH3).

Based on the above, the cutover bog (PB4), buildings and artificial surfaces (BL3) and wet grassland (GS4) were assessed as being of Local Importance (Lower Value). The areas of scrub (WS1) and wet heath (HH3) were assessed as being of Local Importance (Higher Value)

The proposed substation site, which will be located approximately 900m south-west of turbine 2 within an area of wet grassland (GS4) and degraded lowland blanket bog (PB3) with some drainage ditches (FW4) also occurring. The wet grassland contains typical species associated with this habitat and is dominated by soft rush. The majority of the substation will be located in

an area of degraded lowland blanket bog, the vegetation here was dominated by purple moor-grass and bell heather, with sphagnum species occurring abundantly. This area does show signs of historic peat extraction (turf banks) and contained areas of self-seeded lodge pole pine and Rhododendron (*Rhododendron ponticum*). Bare peat was also recorded at a number of locations. The drainage ditches (FW4) crossing the area were heavily vegetated and also dominated by soft rush. Sheep were recorded grazing in the vicinity of the proposed substation leading to a very short ground layer and low diversity in species.

Based on the above, the drainage ditches (FW4), wet grassland (GS4) and area of lowland blanket bog (PB3) were assessed as being of Local Importance (Lower Value),

The proposed met mast, which will be located approximately 400m west of Turbine 13, is located entirely within cutover bog (PB4) habitat. This area of cutover bog PB4 consisted largely of exposed peat and some areas vegetation, which are dominated by cotton grass species. This area contained no management. This cut over bog was assessed as being of Local Importance (Lower Value).

7.7.2.1.5 Borrow Pits

The two proposed borrow pit areas cover a total area of 41 ha. The areas are mostly dominated by cutover bog (PB4) which consists largely of exposed peat and some areas of exposed gravels/stones (ED1) or wetter areas, where some surface water forms shallow pools. Within most of the areas the vegetation cover is more than 50%. The two dominant plant species in the cutover vegetation are soft rush and bog-cotton species. Other vascular plant species have a rather patchy distribution with the most frequent being bulbous rush, purple moor-grass and bent grass species, with sphagnum moss species occurring in wetter areas. These areas of cut over bog are not being managed and are slowly beginning to recolonise. One borrow pit (located approx. 300m from turbine 16) covering an area of 2.6 ha, is located within a habitat of dry silicious heath (HH1). This area is dominated by ling, with bell heather and heath rush abundant. Sheep grazing was noted in the area, but the habitat condition was considered to be moderate. A small area of lowland blanket bog (PB3) is contained within the borrow pit area to the east of Turbine 6. This small section of lowland blanket bog (PB3) is dominated by bog cotton species, with heather species and white beaked sedge occurring also. The vegetation height is relatively low, and the peat is slightly dry, likely due to the adjacent cut over bog and drainage ditches (FW4)

Based on the above, the cutover bog and drainage ditch habitats were assessed as being of Local Importance (Lower Value), the small area of low land blanket bog and area of dry siliceous heath was assessed as being of Local Importance (Higher Value).

7.7.2.1.6 Grid Connection Route

The proposed grid connection route is primarily located along existing internal wind farm roadways with the exception of some sections of the route which will be located over cutover bog (PB4) and will include a river crossing point. From the substation, the cable will follow existing internal wind farm roads, which are categorised as buildings and artificial surfaces (BL3). The route will then cross sections of cutover bog (PB4) that run alongside existing roads, before coming to the Oweninny River (lowland/depositing river [FL2]) crossing point. No in stream works will occur here, the cable will cross the river via an existing bridge, into an area of wet grassland (GS4). After crossing the public road (L52925) the route will continue through an area of cutover bog (PB4) as well as along the edge of two improved agricultural grassland (GA1) fields before connecting to the existing substation at Bellacorick. Parts of the internal wind farm roads are also bounded by drainage ditches (FW4) that are dominated by soft rush, creeping buttercup and selfheal.

The cutover bog, buildings and artificial surfaces, improved agricultural grasslands and drainage ditch habitats were assessed as being of Local Importance (Lower Value). The Oweninny River (FL2) was assessed as being of County importance as it provides spawning and nursery habitats for salmonids, crayfish and lamprey as well as providing suitable habitat for otter.

7.7.2.1.7 Peat Deposition Areas

The five proposed peat deposition areas (PDAs) cover a total area of 29 ha. These areas are mostly dominated by cutover bog (PB4) which consists largely of exposed peat with smaller pockets of dry siliceous heath (HH1), wet heath (HH3) and drainage ditches (FW4). The species across all of these habitats are similar, with the most dominant plant species consisting of bog cotton, ling heather and soft rush species. Other plant species present in much smaller quantities include lodge-pole pine, bulbous rush and purple moor-grass. The wet heath and dry siliceous heath within these PDAs did not conform with any Annex I habitats due to a poor species diversity and evidence of grazing throughout.

Based on the above information, and the species present within each of these habitats, the cutover bog and drainage ditch have been assessed as being of Local importance (Lower Value)

and the dry siliceous heath and wet heath have been assessed as being of Local Importance (Higher Value).

7.7.2.1.8 Turbine Delivery Route

There are three proposed TDRs for this proposed development, all of which are outlined in Chapter 17 Traffic and Transportation, one of these TDRs includes the same route that was utilised by the adjacent Oweninny Windfarm (Phases 1 and 2). The proposed port of arrival for the abnormal loads (i.e. turbine components and transformer) has not been confirmed for this proposed development at the time of writing), however based on the delivery route for the turbines located in Phase one of the Oweninny site, the port at Killybegs may be used.

The TDR utilised for the adjacent and constructed Oweninny windfarm (Phases 1 and 2) involved travel from the Harbour at Killybegs to Donegal Town along the N56 national road. From Donegal Town, the route will travel south to Ballyshannon and Bundoran on the N15, till reaching Sligo Town and the N4. The route will then travel to Ballisodare where it will travel on the N59 through Ballina and Crossmolina till reaching the proposed development site entrance. The majority of the roads used are sufficiently wide and won't require accommodation works to facilitate the delivery of turbine components, none of the three proposed TDRs will require the use of third party lands, therefore any further vegetation removal for the TDRs is not anticipated.

7.7.2.1.9 Protected Flora

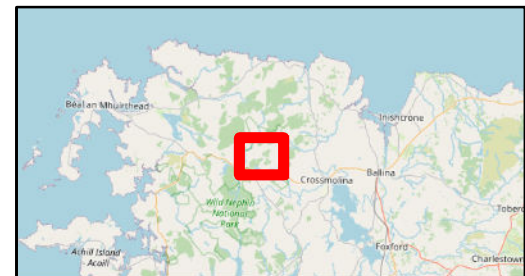
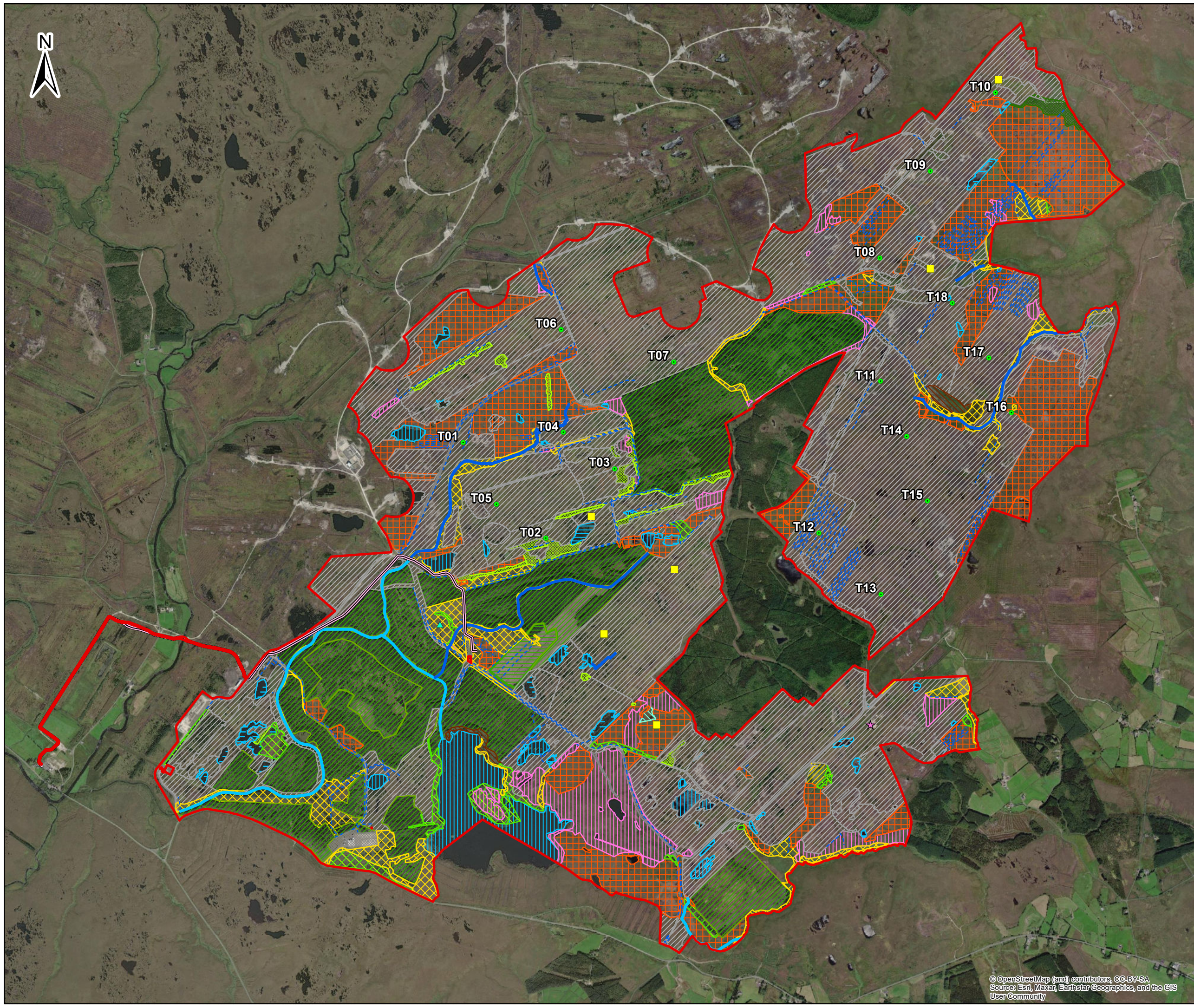
No botanical species listed under Annex II of the EU Habitats Directive or listed under the Flora Protection Order (FPO) or red list of vascular plant species were recorded within the footprint of the proposed development site.

7.7.2.1.10 Invasive Species

Rhododendron which is an invasive species listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015) was recorded at a number of locations during the extensive field surveys undertaken at the proposed development site. The majority of these locations were recorded close to the western or north-western edge of the proposed development site boundary (See Figure 7-4). The number of stands ranged at each location from one to several plants. The majority of the recorded stands were capable of producing flowers and seeds.

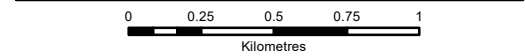


Photo 7-14: Mature Rhododendron plant located under existing turbine (which is proposed to be decommissioned) in Bellacorick wind farm, note the seedpods on the left of the plant.



Legend

Planning Application Boundary	GS2 Dry meadows and grassy verges
Habitats	GS3 Dry humid acid grassland
FP1 Calcareous springs	GS4 Wet grassland
PF2 Poor fen and flush	HH1 Dry siliceous heath
PF3 Transition mire and quaking bog	HH3 Wet heath
FW1_Eroding/upland...	PB3 Lowland blanket bog
FW2_Depositing/lo...	PB4 Cutover bog
FW4_Drainage_ditc...	PF3 Transition mire and quaking bog
BL3 Buildings and artificial surfaces	WD3 (Mixed) conifer woodland
FL1 Dystrophic lakes	WD4_Conifer_plant...
FL2 Acid oligotrophic lakes	WN7 Bog woodland
FL8 Other artificial lakes and ponds	WS1 Scrub
GA1 Improved agricultural grassland	WS2 Immature woodland
GA2 Amenity grassland (improved)	WS5 Recently felled woodland



- NOTES**
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
 2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
 3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
 4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
D02	24/03/2023	Draft issue	S.P	J.D
D01	16/02/2023	Draft issue	S.P	J.S

Client:
Bord na Móna

Project:
Oweninny Wind Farm
Phase 3

Title:
Figure 7-3:
Habitat Map

Scale @ A3: 1:26,000

Prepared by: S.Pezzetta Checked: J.Sherry Date: March 2023

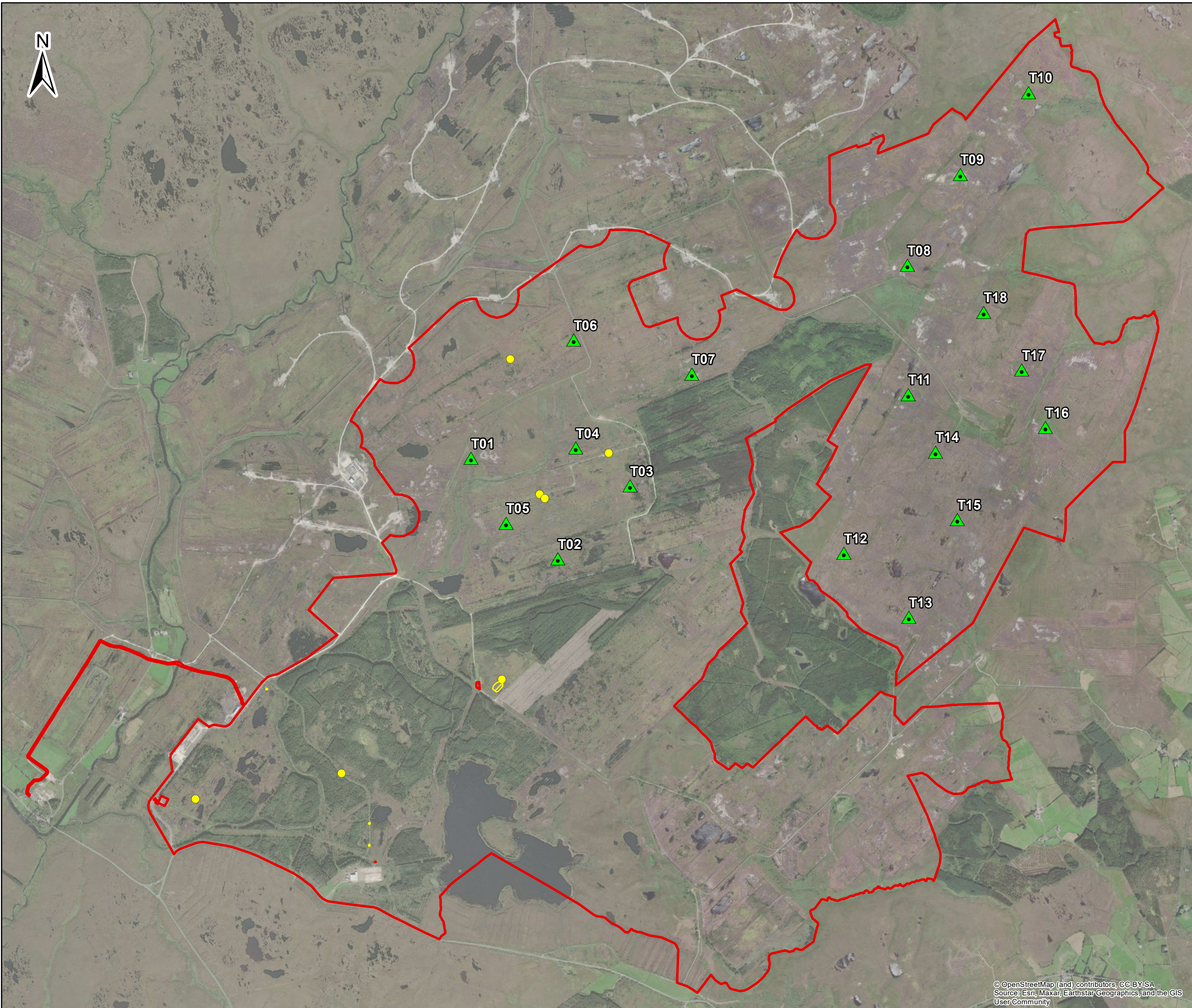
Project Director: D.Grehan

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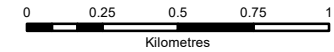


Legend

- Planning Application Boundary
- ▲ Proposed Turbine Locations

Invasive Species

- Single Stand of Rhododendron
- Extensive Stands of Rhododendron



- NOTES**
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
 2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
 3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
 4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
D02	22/03/2023	Draft issue	S.P	J.D
D01	01/02/2023	Draft issue	S.P	J.S

Client: **Bord na Móna**

Project: Oweninny Wind Farm Phase 3

Title: **Figure 7-4:
Rhododendron Distribution Map**

Scale @ A3: 1:25,000

Prepared by: S.Pezzetta Checked: J.Sherry Date: March 2023

Project Director: D.Grehan

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Draft:
D02

10889-008-RHOD-S.BO-TOB-D02

7.7.2.1.11 Evaluation of Habitats at infrastructure sites

An evaluation of the significance of habitats and flora recorded at the site was carried out in accordance with the criteria outlined in (NRA, 2009c)².

The majority of the proposed development site is located within previously modified habitats (past peat extraction) or semi natural/regenerating areas. Table 7-11 lists the habitats present within the proposed development footprint and their ecological evaluation as per NRA (2009c)².

Table 7-11: Ecological Evaluation of Habitat within the Proposed Development Footprint

Proposed Infrastructure	Habitat within the proposed development footprint	Ecological Evaluation	KER
Turbine 1	Cutover Bog (PB4), Drainage Ditch (FW4)	Local Importance (Lower Value)	No
Turbine 2 and 3	Immature Woodland (WS2), Cutover Bog (PB4), Drainage Ditch (FW4)	Local Importance (Lower Value)	No
Turbine 4	Cutover Bog (PB4) with good recolonisation	Local Importance (Higher Value)	Yes
Turbine 5	Cutover Bog (PB4)	Local Importance (Lower Value)	No
Turbine 6	Cutover Bog (PB4)	Local Importance (Lower Value)	No
Turbine 7	Cutover Bog (PB4)	Local Importance (Lower Value)	No
Turbine 8	Cutover Bog (PB4), Buildings and Artificial Surfaces (BL3), Dry Calcareous and Neutral Grassland (GS1)	Local Importance (Lower Value)	No
Turbine 9	Cutover Bog (PB4)	Local Importance (Lower Value)	No
Turbine 10	Cutover Bog (PB4), Lowland Blanket Bog (PB3)	Local Importance (Lower Value)	No
Turbine 11, 13, 14 and 15	Cutover Bog (PB4)	Local Importance (Lower Value)	No
Turbine 12	Cutover Bog (PB4), Drainage Ditch (FW4)	Local Importance (Lower Value)	No

Proposed Infrastructure	Habitat within the proposed development footprint	Ecological Evaluation	KER
Turbine 16	Cutover Bog (PB4), Lowland Blanket Bog (PB3)	Local Importance (Lower Value)	No
Turbine 17 and 18	Cutover Bog (PB4)	Local Importance (Lower Value)	No
Access Tracks, Roads, Amenity track and Turning Bays	Cutover Bog (PB4), Buildings and Artificial Surfaces (BL3), Wet Grassland (GS4), Drainage Ditch (FW4), Lowland Blanket Bog (PB3) (degraded)	Local Importance (Lower Value)	No
	Lowland Blanket Bog (PB3),	Local Importance (Higher Value)	Yes
	Wet Heath (HH3), Eroding/Upland Rivers (FW1)	County Importance	Yes
Site Compounds	Buildings and Artificial Surfaces (BL3), Wet Grassland (GS4), Cutover Bog (PB4), Lowland Blanket Bog (PB3) (degraded)	Local Importance (Lower Value)	No
	Scrub (WS1), Wet heath (HH3) (degraded)	Local Importance (Higher Value)	Yes
Met Mast	Cutover Bog (PB4)	Local Importance (Lower Value)	No
Substation	Lowland Blanket Bog (PB3) (degraded), Wet Grassland, Drainage Ditch (FW4)	Local Importance (Lower Value)	No
Borrow Pits	Cutover Bog (PB4), Drainage Ditch (FW4)	Local Importance (Lower Value)	No
	Lowland Blanket Bog (PB3), Dry Siliceous Heath (HH1)	Local Importance (Higher Value)	Yes
Grid Connection Route	Buildings and artificial surfaces (BL3), Cutover Bog (PB4), Agricultural grassland (GA1), Drainage Ditch (FW4)	Local Importance (Lower Value)	No

Proposed Infrastructure	Habitat within the proposed development footprint	Ecological Evaluation	KER
	Depositing/lowland rivers (FW2)	County Importance	Yes
Peat Deposition Areas	Cutover Bog (PB4), Drainage Ditch (FW4)	Local Importance (Lower Value)	No
	Dry siliceous Heath (HH1), Wet Heath (HH3)	Local Importance (Higher Value)	Yes

7.7.2.2 Non-Avian Fauna

Results of protected fauna species recorded during the surveys is provided hereunder.

7.7.2.2.1 Bat Surveys

The bat reports detailing all the surveys undertaken by Bat Eco Services at the proposed development site in 2020 and 2022 is provided in Appendix 7.2 and the following is a summary of the main findings of the reports. As noted, the survey design followed the following methodologies: desktop study, deployment of static detectors, walked transects, point counts and driven transects, roost surveys, as well as monitoring of climatic conditions as per SNH guidance document; (SNH, 2019)²⁰.

Bat Roosts

During 2020 and 2022, suitable roost features within the proposed development site (buildings, structures and trees) were assessed for bat roost potential and six bat roosts were identified (the locations of which and the species recorded can be found in

Figure 7-5 and Table 7-12). One dawn and six dusk surveys were undertaken as well as two sessions of Infra-red filming of emergence of roosting bats was carried out.

A maternity roost of Natterer's bat was recorded in the toilet block within the centre of the proposed development site (28 individuals) and a satellite roost was recorded in the Bórd na Móna buildings to the south of the site. Individuals were recorded commuting between these two roosts via the Muing River and conifer woodlands. Two satellite roosts (Interpretative Centre and Bord na Móna buildings) and one night roost (Agricultural barn) was recorded for

soprano pipistrelles within the survey area. A satellite roost was also recorded for brown long-eared bats in the Bord na Móna buildings.

The identification of the toilet block as a Natterer’s bat maternity roost is a significant find as this is not a common bat species in west Mayo. The use of the toilet block, a building not normally considered as a suitable roosting place for a maternity roost for this species of bat, may be due to the paucity of suitable buildings in vicinity of suitable bat habitat such as the woodland areas present within the survey area. The area is also sufficiently dark for this light sensitive bat species.

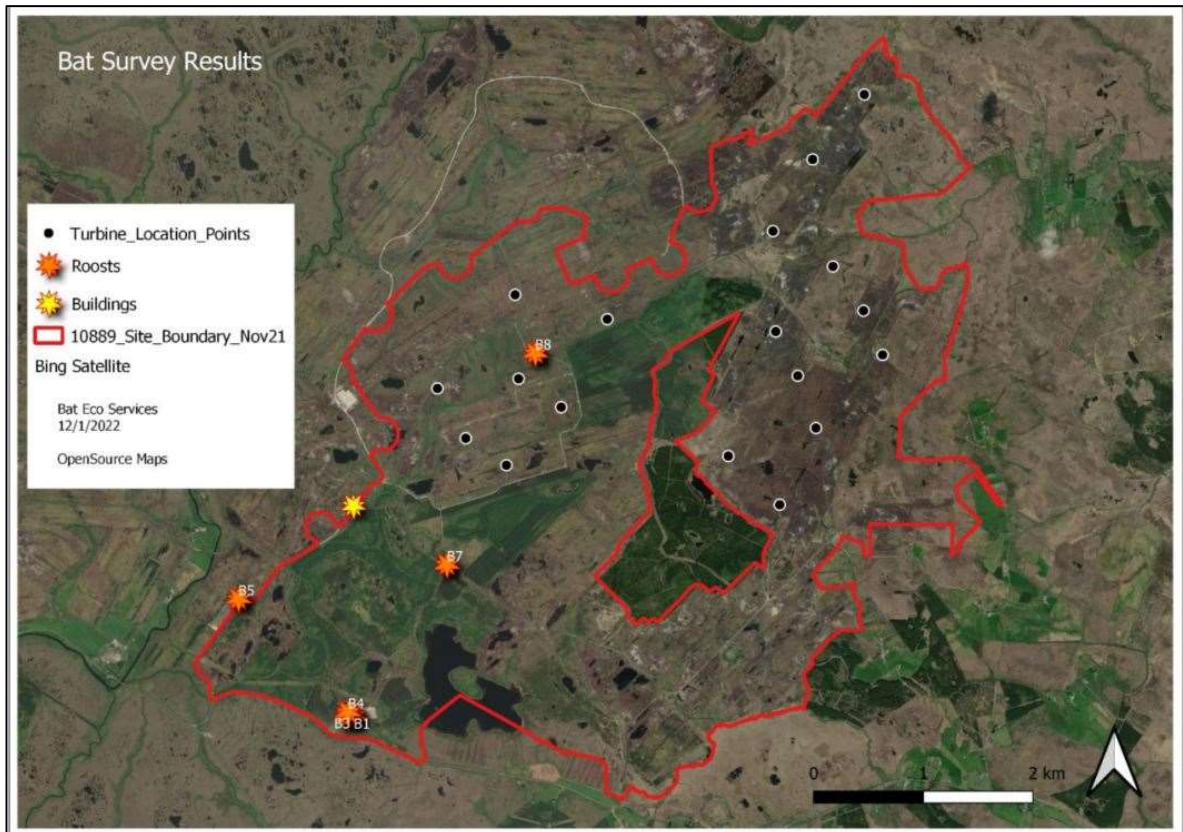
The identification of the natural stone walls of the interpretative centre as a soprano pipistrelle roost is also an important find. While this species is common, the construction of the walls lend them to be highly suitable for individual or small groups of bats. This building, which was newly constructed during the 2020 surveys, is likely to become an important roost in the preceding years as local bat populations identify it’s potential roosting value.

The other satellite roosts located in Bord na Móna buildings or agricultural buildings recorded small numbers of bats, ranging from one to five individuals.

Table 7-12: Bat Roost Locations and Numbers and Species of Roosting Bats

Site	Grid Reference (ING)	Grid Reference (ITM)	Roost type	Species	Distance to Nearest Turbine
Bord na Móna Buildings (B1)	F 99090 19614	499061 E 819622 N	Satellite	Soprano pipistrelle, Natterer’s bat	c. 2.6km
Bord na Móna Buildings (B3)	F 99038 19619	499011 E 819628 N	Satellite	Soprano pipistrelle, Natterer’s bat	c. 2.6km
Bord na Móna Buildings (B4)	F 99037 19642	499010 E 819651 N	Satellite	Brown long-eared, Natterer’s bat	c. 2.6km
Interpretative centre (B5)	F 98060 20693	498033 E 820702 N	Satellite	Soprano pipistrelle	c. 2.3km
Agricultural barn (B7)	F 99966 20964	499939 E 820973 N	Night Roost	Soprano pipistrelle	c. 1 km
Toilet Block (B8)	G 00813 22869	500786 E 822877 N	Maternity	Natterer’s bat	c. 280m

Figure 7-5: Roosts Located in Buildings Recorded Within the Site Boundary



Transects and Static Detectors

Ten walking transects and six driven transects were conducted within the proposed development site, surveying tracks, open peatland and woodlands present throughout.

Seasonal static surveys were conducted in spring, summer and autumn in 2020 and 2022 using static detector units. Detectors were placed at 19 locations in spring 2020 and 20 locations summer and autumn 2020, 13 locations were used in spring, summer and autumn in 2022 – either at the exact location of a proposed turbine or in representative habitat close by. In 2020 a static detector was also placed on the existing met mast within the proposed development site, this detector was placed at a height of 4m with the microphone at a height of 55m.

In all three of the survey periods, spring, summer and autumn, the three most frequently recorded species were common pipistrelle, soprano pipistrelle and Leisler’s bat in descending order, which mirrors the estimated populations of these three species in Ireland. High levels of

Natterer’s bat activity was recorded at specific detectors during the spring surveys. The majority of the bat passes for this species were recorded near the maternity roost for Natterer’s bat, recorded in the disused toilet block. Individuals of this roost commuted in a southerly direction where they dispersed out into the open bog and towards the forestry. During the dusk surveys, it was noted that emerging individuals commuted to the river/drainage network adjacent to the building and used this to disperse in the survey area.

During the Summer and Autumn Static Surveillance, common pipistrelles and soprano pipistrelle were the most frequently recorded bat species. Four soprano pipistrelle roosts were recorded within the proposed development site and the static detector units with the highest level of common and soprano pipistrelle bat passes were located adjacent to these roosts and radiated in a north easterly direction. Each of the statics were located near edges of woodland/conifer plantation indicating that these are likely common commuting routes to areas to the northeast of the proposed development site.

Low levels of Daubenton’s, whiskered and brown long-eared bat activity were also recorded within the proposed development site.

The turbine locations considered to be of concern for local bat populations, are those located close to woodland and forestry which are important commuting and foraging habitat for local bat population and those close to the recorded roosts, the distances from identified turbines can be seen in Table 7-13.

Table 7-13: Identified Turbines Close to Forestry and Known Roosts

Turbine Number	Distance to Nearest Woodland Edge or Known Roost
T02	c. 170m from conifer plantation
T03	c. 180m from conifer plantation, c. 550m from roost(B8)
T04	c.280m from roost (B8)
T07	c. 90m from conifer plantation
T11	c. 330m from conifer plantation
T12	c. 280m from conifer plantation
T13	c. 270m from conifer plantation

Bat Results Summary

A total of eight bat species were recorded utilising the proposed development site during the transect and static detector surveys and are as follows:

Soprano pipistrelle

A total of 182 geo-reference bat encounters were recorded for this species of bat during the array of bat surveys completed. This bat species was recorded throughout the survey area. It was recorded on 88 of the 98 static unit locations. Four satellite roosts were also recorded, as noted in Table 7-12 and

Figure 7-5.

Common pipistrelle

A total of 118 geo-reference bat encounters were recorded for this species of bat during the array of bat surveys completed. This bat species was recorded throughout the survey area. It was recorded on 89 of the 98 static unit locations. No bat roosts were recorded within the survey area for this bat species.

Leisler's bat

A total of 96 geo-reference bat encounters were recorded for this species of bat during the array of bat surveys completed. This bat species was recorded throughout the survey area. It was recorded on 70 of the 98 static unit locations. No bat roosts were recorded within the survey area for this bat species.

Nathusius' pipistrelle

Only two geo-reference bat encounters were recorded for this species of bat during the array of bat surveys completed. This bat species was recorded in the north-west area of the proposed development site. It was recorded on 2 of the 59 static unit locations. No bat roosts were recorded within the survey area for this bat species.

Natterer's bat

A total of 117 geo-reference bat encounters were recorded for this species of bat during the array of bat surveys completed. This bat species was recorded throughout the survey area. It was recorded on 32 of the 98 static unit locations. One maternity roost and three satellite roosts were also recorded, as noted in Table 7-12 and

Figure 7-5.

Daubenton's bat

A total of 70 geo-reference bat encounters were recorded for this species of bat during the array of bat surveys completed. This bat species was recorded throughout the survey area. It was recorded on 41 of the 98 static unit locations. No bat roosts were recorded within the survey area for this bat species.

Whiskered bat

A total of 18 geo-reference bat encounters were recorded for this species. It was recorded on 17 of the 98 static unit locations. No bat roosts were recorded within the survey area for this bat species.

Brown long-eared bat

A total of 69 geo-reference bat encounters were recorded for this species of bat during the array of bat surveys completed. This bat species was recorded throughout the survey area. It was recorded on 61 of the 98 static unit locations. Two satellite roosts were also recorded as noted in Table 7-12 and

Figure 7-5.

7.7.2.2 Non-volant Mammal Surveys

Otter

An otter survey was undertaken within the proposed development site in August 2020 as well as other incidental observations recorded during other surveys (April 2020 – March 2021). No signs of otter (which included, tracks, slides and spraints), otter holts or resting sites were identified during the August 2020 surveys. Two incidental records of otter however were recorded near waterbodies in October 2020. (Refer to Figure 7-6). These were live sightings of otter foraging in lakes within the proposed development site on cutover bog, one located within the northwest portion of the site and one located near the centre of the site.

Otter is a qualifying interest of the Owenduff/Nephin Complex SAC (000534) and the River Moy SAC (002298) which are located approximately 4km and 7km downstream of the proposed

development site. The territories of otter can stretch for several kilometres, ranging from as small as 2km and extending up to 20km in cases³⁷.

Otter, which may occur in proximity to the proposed development may be associated with the downstream SAC population; therefore, otter is categorised as being of International Importance.

Badger

A badger survey was undertaken within the proposed development site in August 2020 as well as other incidental observations recorded during other surveys (April 2020 – March 2021). Evidence of badger, in the form of tracks, were recorded on one occasion to the north of the conifer plantations in the centre of the proposed development site, there was also one incidental record of a roadkill badger near the Bord na Móna buildings to the south of the site (refer to Figure 7-6). No setts were recorded over the entire survey period. It is considered that badger is sparsely distributed throughout the site, with the main focus in the vicinity of conifer plantations. The badger population onsite are considered as being of Local Importance (Higher Value).

Pine Marten

Evidence of pine marten was surveyed for on the site during August 2020 as well as other incidental observations recorded during other surveys (April 2020 – March 2022). No records of pine marten were recorded during August 2020, but two incidental, live sighting records of pine marten were recorded in July 2020, in the centre of the proposed development site, near the dense area of conifer plantation (refer to Figure 7-6). It is considered that pine marten is sparsely distributed throughout the site, with the main focus in the vicinity of conifer plantations. The pine marten population onsite were assessed as being of Local importance (Higher Value).

Other Mammal Species

Irish hare were recorded on numerous occasions during the August 2020 walkover surveys and other incidental sightings. The species is widely distributed throughout the entire proposed development site. The hare population onsite were assessed as being of Local importance (Higher Value).

³⁷ <https://www.vincentwildlife.ie/species/otter>

Red deer (*Cervus elaphus*) were recorded on numerous occasions during the August 2020 walkover surveys and other incidental sightings. This population of red deer is believed to have been released within the Bellacorick area in the 1990s/early 2000s and so are not native to the locality (McNulty, 2007)³⁸. Small herds of up to 15 animals are regularly seen throughout the proposed development site. As the species is protected under national law, red deer onsite are considered of Local Importance (Higher Value)

Evidence of fox including live sightings, scat and dens were recorded in a number of locations throughout the proposed development site. Foxes are not protected under European or National law, however there is an obligation to protect biodiversity within Ireland under the Convention on Biological Diversity.

Other mammal species likely to occur within the proposed development site include rabbit (*Oryctolagus cuniculus*), Irish stoat (*Mustela erminea*), pygmy shrew (*Sorex minutus*) and hedgehog (*Erinaceus europaeus*). This assumption is based on the widespread distribution of these species in Ireland and the availability of suitable habitat present within the proposed development site.

7.7.2.2.3 Amphibians and Reptiles

Common Frog

Common frog was recorded throughout the proposed development site, occurring on wet bog, pond areas and within drains along tracks. Only adults were recorded during walk over surveys, given the time of year (August) but due to the wide availability of suitable habitat, it is likely that they breed onsite. The species is listed under Annex V of EU Habitats Directive and protected under the Wildlife Acts.

The local common frog population was assessed as being Local Important (Higher Value).

Common Lizard

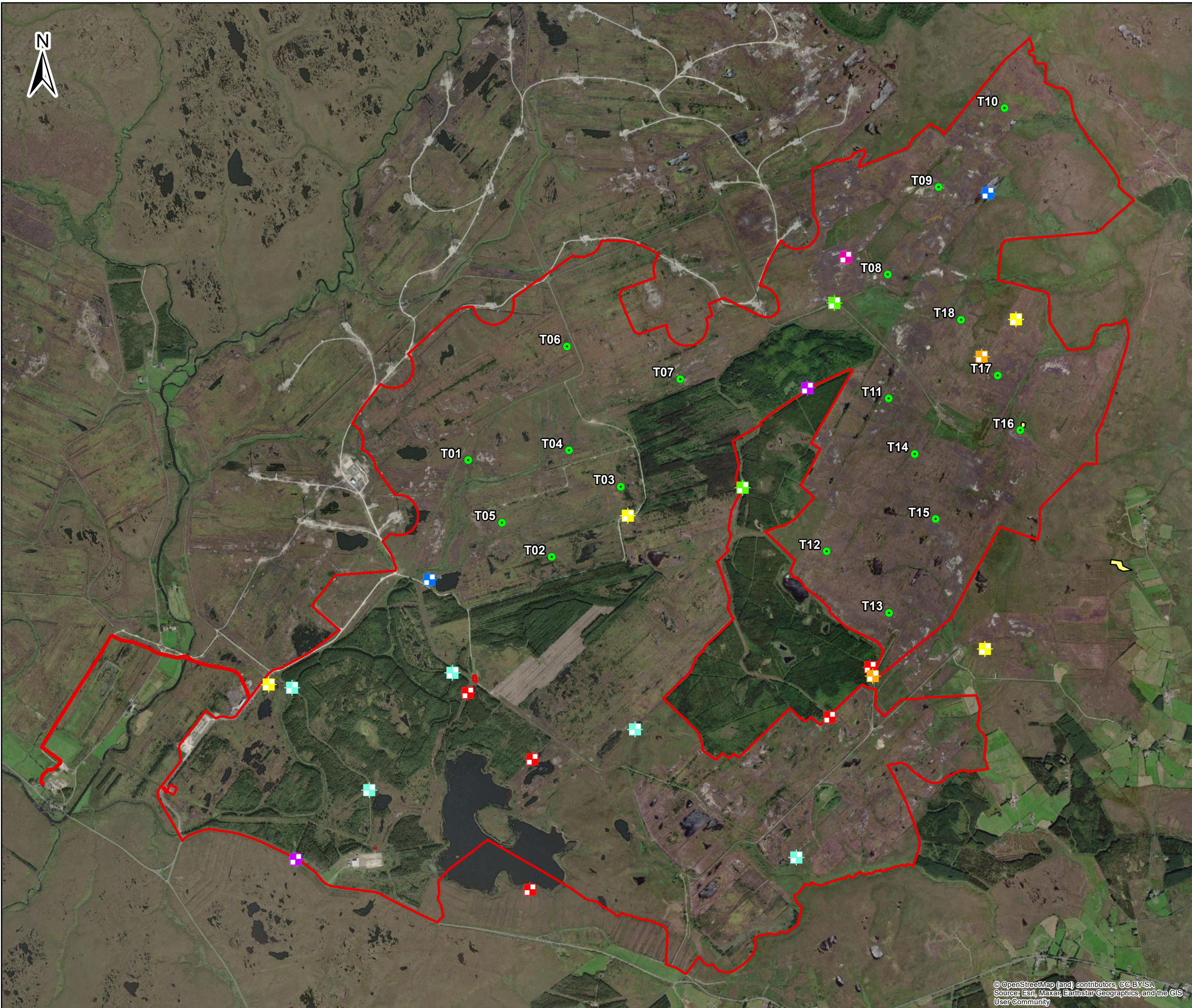
Common lizard, a species often found on peatlands and open areas, has been recorded on a number of occasions during the surveys, in bog habitat to the north and north-west of the proposed development site, and is likely to be widespread throughout the site. The species is protected under the Wildlife Acts.

³⁸ McNulty, A. (2007) 'Deer causing concern in Bellacorick', *Mayo News*. 9th October. Available online at: <https://www.mayonews.ie/news/2555-arsquocheekyarsquo-deer-causing-concern> [accessed February 2023].

The local common lizard population was assessed as being Local Important (Higher Value).

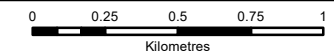
7.7.2.2.4 Marsh Fritillary

A survey for marsh fritillary was undertaken in late August 2020, in areas of suitable habitat/where devils bit scabious was found to be abundant. Two areas were recorded as having good habitat for marsh fritillary (based on NRA 2009b⁷ guidelines). These areas were located near the eastern edge of the proposed development site (refer to Figure 7-6). They contained a large amount of devils bit scabious, with a medium height, dry sward. However, no marsh fritillary webs were recorded at both of these locations. Stands of devils bit scabious were also recorded throughout the proposed development site, but larval webs were not recorded at these locations.



Legend

- Planning Application Boundary
- Badger
- Irish Hare
- Otter
- Pine Marten
- Red Deer
- Red Fox
- Common Frog
- Common Lizard
- Suitable Marsh Fritillary Habitat



NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
D02	22/03/2023	Draft issue	S.P	J.D
D01	01/02/2023	Draft issue	S.P	J.S

Client: **Bord na Móna**

Project: Oweninny Wind Farm Phase 3

Title: Figure 7-6: Non-Avian Fauna Map (excluding Bats)

Scale @ A3: 1:26,000

Prepared by: S.Pezzetta Checked: J.Sherry Date: March 2023

Project Director: D.Grehan

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Draft: **D02**

10889-020-SPE-S.BO-TOB-D02

7.7.2.3 Aquatic Ecology

7.7.2.3.1 Study area

The aquatic survey sites were located in the Owenmore[Mayo]_SC_010 and the Owenmore[Mayo]_SC_020 sub-catchments within the wider Blacksod-Broadhaven catchment or in Cloonaghmore_SC_010 and Deel [Crossmolina]_SC_010 WFD sub-catchments within the wider Moy & Killala Bay catchment.

The watercourses within and in the vicinity of the proposed development site are typically small, upland eroding (FW1) or lowland depositing (FW2) channels. Water Quality (WFD) for the area is discussed in section 7.7.1.4.1.

7.7.2.3.2 Aquatic survey site results

The following section summarises each aquatic survey site in terms of aquatic habitats, its physical characteristics and fish communities. Habitat codes are according to Fossitt (2000). The sites were surveyed in August 2020 and again in September 2021. Kick sampling could only be undertaken at four locations around the proposed development site as some areas could not be surveyed due to access restrictions or unsuitable conditions. Samples were transferred to a white sorting tray to be examined bankside and an EPA Q-value determination was made. Kick samples and Q-values were recorded at sites 1, 3, 4 and 6. The location of all sample sites are shown in Figure 7-7.

Electrofishing was conducted to determine fish communities. The full electrofishing report can be seen in Appendix 7.3 Oweninny Electronic Fishing Survey Results Report.

Site 1 – Muingaleeaun stream (IE_WE_33M010100)

Site 1 on the Muingaleeaun Stream (WFD code: IE_WE_33M010100) is a small lowland depositing watercourse (FW2), located to the southwest of the proposed development site, c. 180m west of the substation or c. 1km southwest from the nearest turbine (T02). The bank width was 1.5m with a wet width of 1m and an average water depth of 75cm. There was a very slow flow at the time of surveying and consisted entirely of glides. The substrata comprised of gravel, peat and silt, and was noted as being extremely soft when walked on. The banks were straight cut and vertical. Riparian vegetation consisted of soft rush, marsh thistle, bramble and flag iris. Instream macrophytes were approximately 30% coverage and comprised of flag iris and soft rush.

The watercourse was noted as having no potential for salmonid spawning due to lack of suitable gravels. In addition, no suitable crayfish habitat was recorded. Some suitable lamprey habitat was recorded where overhanging vegetation and bank ledges provided shelter.

The kick sampling results at Site 1, showed the presence of Group B invertebrates with some cased caddisfly (*Trichoptera spp.*). An EPA Quality Rating (Q value) of Q3 (Poor) was assigned to the site. Electro-fishing of the stream revealed a small population of one and two-year-old trout. It is noted that despite its small size this is a valuable nursery area for trout for the Muing River and possibly contributes to the trout population at Lough Dahybaun.

Site 2 - Sruffaunnamuinggabatia River (IE_WE_33O040050)

Site 2 on the Sruffaunnamuinggabatia River (WFD code: IE_WE_33O040050) is a medium lowland depositing watercourse (FW2) located to the north of the proposed development site, c.900m northwest of the nearest borrow pit or c. 1km northwest from the nearest turbine (T06). The bank width was 14m with a wet width of 4m and an average water depth of 150cm. There was a very slow flow at the time of surveying and consisted entirely of glides. The substrata comprised entirely of silt and was noted as being extremely soft when walked on. The banks were straight cut and vertical. Riparian vegetation consisted of soft rush, heather, bramble and dandelion. Instream macrophytes were at approximately 60% coverage and comprised of flag iris, soft rush marsh bedstraw and jointed rush.

No kick sample and Q-value was obtained for this site, due to a high amount of silt and soft riverbed.

The watercourse was noted as having low potential for salmonid spawning due to lack of suitable gravels/silty riverbed which would provide suitable spawning habitat. However, during electro-fishing surveys a high number of first year Atlantic salmon were recorded and some second-year fish were also recorded. There were first and second-year trout present also, along with stickleback and minnow. No crayfish or lamprey or suitable habitat for the species was recorded within the watercourse.

Site 3 - Muing River (IE_WE_33M010100)

Site 3 on the Muing River (WFD code: IE_WE_33M010100) is a medium lowland depositing watercourse (FW2), located to the southwest of the proposed development site, c.1.4m west of the substation or c. 2.1km southwest from the nearest turbine (T02). The bank width was 4m with a wet width of 4m and an average water depth of 70cm. There was a moderate flow at the

time of surveying and consisted entirely of glides. The substrata comprised of gravels and silt. The banks were straight cut and vertical. Riparian vegetation consisted of soft rush, heather, bramble and dandelion. Instream macrophytes were at approximately 60% coverage and comprised of flag iris, soft rush marsh bedstraw and jointed rush.

Kick sampling showed the presence of Group C and D species. An EPA Quality Rating (Q value) of Q3 (Poor) was assigned to the site.

The watercourse was noted as having low potential for salmonid spawning due to lack of suitable gravels which would provide suitable spawning habitat. No crayfish or lamprey or suitable habitat for the species was recorded within the watercourse.

Electro-fishing surveys revealed the river supports a population of mainly second year trout and some salmon, with stickleback and minnow also present. The dominant feature of this site was the presence of lamprey species (either brook or river lamprey), a total of five were recorded. Lamprey, because of their preferred habitat, are difficult to electro-fish and it is assumed that the number observed are understated. Overall, this is a productive stream providing nursery areas for salmon and trout. The presence of a good population of lamprey makes this a sensitive section of river.

Site 4 – Fiddaunatooghaun (IE_WE_34S010400)

Site 3 on the Fiddaunatooghaun (WFD code: IE_WE_34S010400) is a medium lowland depositing watercourse (FW2) located to the south of the proposed development site, c. 2.7km south from the nearest turbine (T13). The bank width was 2m with a wet width of 2m and an average water depth of 15cm. There was a fast flow at the time of surveying and consisted mostly of riffles with some glides. The substrata is comprised of boulders, gravels and cobbles. The banks were vertical with some areas undercut. Riparian vegetation consisted of Yorkshire fog, meadow sweet, bramble and dandelion. Instream macrophyte cover was low and comprised of watercress species and water mint.

Kick sampling showed the presence of group A, group B and some group E species. An EPA Quality Rating (Q value) of Q4 (Good) was assigned to the site.

The watercourse was noted as having potential for salmonid spawning due to good flow and the presence of some suitable spawning gravels. One ad hoc record of crayfish was caught in a net when kick sampling. There is also potential for lamprey habitat due to good gravels and over hanging banks.

Electro-fishing surveys revealed the stream contained a number of first- and second-year trout and some salmon. It is noted that trout were very thin, suggesting poor feeding. For its size this is a good salmonid nursery area for trout and salmon.

Site 5 – Shanvolahan (IE_WE_34S010400)

Site 5 on the Shanvolahan (WFD code: IE_WE_34S010400) is a small lowland depositing watercourse (FW2) located to the south of the proposed development site, c. 2.2km south from the nearest turbine (T13). The bank width was 1.5m with a wet width of 0.5m and an average water depth of 15cm. There was a fast flow at the time of surveying and consisted mostly of riffles with some glides. The substrata is comprised of boulders, gravels, cobbles and silt. The banks were steep with some areas undercut. Riparian vegetation consisted of Yorkshire fog, meadow sweet, bramble, willow and dandelion. Instream macrophyte cover was low and comprised of watercress species and water mint.

The watercourse was noted as having potential for salmonid spawning due to good flow and the presence of some suitable spawning gravels. There is potential for lamprey habitat due to good gravels and some overhanging banks. Potential crayfish habitat was also recorded.

Electro-fishing surveys revealed the stream contained a number of first- and second-year trout and some salmon. This is a good salmonid stream providing a nursery area for trout and salmon.

Site 6 – Fiddaunnagosty (IE_WE_34S010400)

Site 6 on the Fiddaunnagosty (WFD code: IE_WE_34S010400) is a small lowland depositing watercourse (FW2). The bank width was 1m with a wet width of 1m and an average water depth of 15cm. There was a fast flow at the time of surveying and consisted mostly of riffles with some glides. The substrata is comprised of boulders, gravels, cobbles and sand. The banks were steep with some areas undercut. Riparian vegetation consisted of Yorkshire fog and devils-bit scabious. Instream macrophyte cover was low at 10% and comprised of Branched Bur-reed (*Sparganium erectum*). The upstream section of the stream has been blocked to provide a road ford for farm traffic. The stream percolates through the rock armoury.

The watercourse was noted as having potential for salmonid spawning due to good flow and the presence of some suitable spawning gravels. There is potential for lamprey habitat due to good gravels and some overhanging banks. Potential crayfish habitat was also recorded.

Kick sampling showed group C species dominant with a few group B and group D species. An EPA Quality Rating (Q value) of Q4 (Good) was assigned to the site.

This stream has good salmonid substrate, but few fish were present, only two trout and one salmon along with three sticklebacks were recorded. The artificial blockage may be influencing the numbers present as the substrate should support greater numbers. Two crayfish were recorded also, the presence of crayfish makes this a sensitive tributary.

Site 7 – Fiddaunnamuing (IE_WE_34C030100)

Site 7 on the Fiddaunnamuing (WFD code: IE_WE_34C030100) is a small upland eroding watercourse (FW1) located to the east of the proposed development site, outside the site boundary, c. 1.8km from the nearest turbine (T15). The bank width was 2m with a wet width of 0.75m and an average water depth of 30cm. There was a moderate flow at the time of surveying and consisted mostly of glides with some riffles. The substrata is comprised of boulders, gravels and cobbles. The banks were steep with some areas undercut. Riparian vegetation consisted of Willowherb, angelica, bracken and willow. Instream macrophyte cover was low at 25% and comprised of willowherb and Yorkshire fog.

The watercourse was noted as having potential for salmonid spawning due to good flow and the presence of some suitable spawning gravels. There is potential for lamprey habitat due to good gravels and some overhanging banks. Potential crayfish habitat was also recorded in the form of boulders and cobbles and overhanging banks.

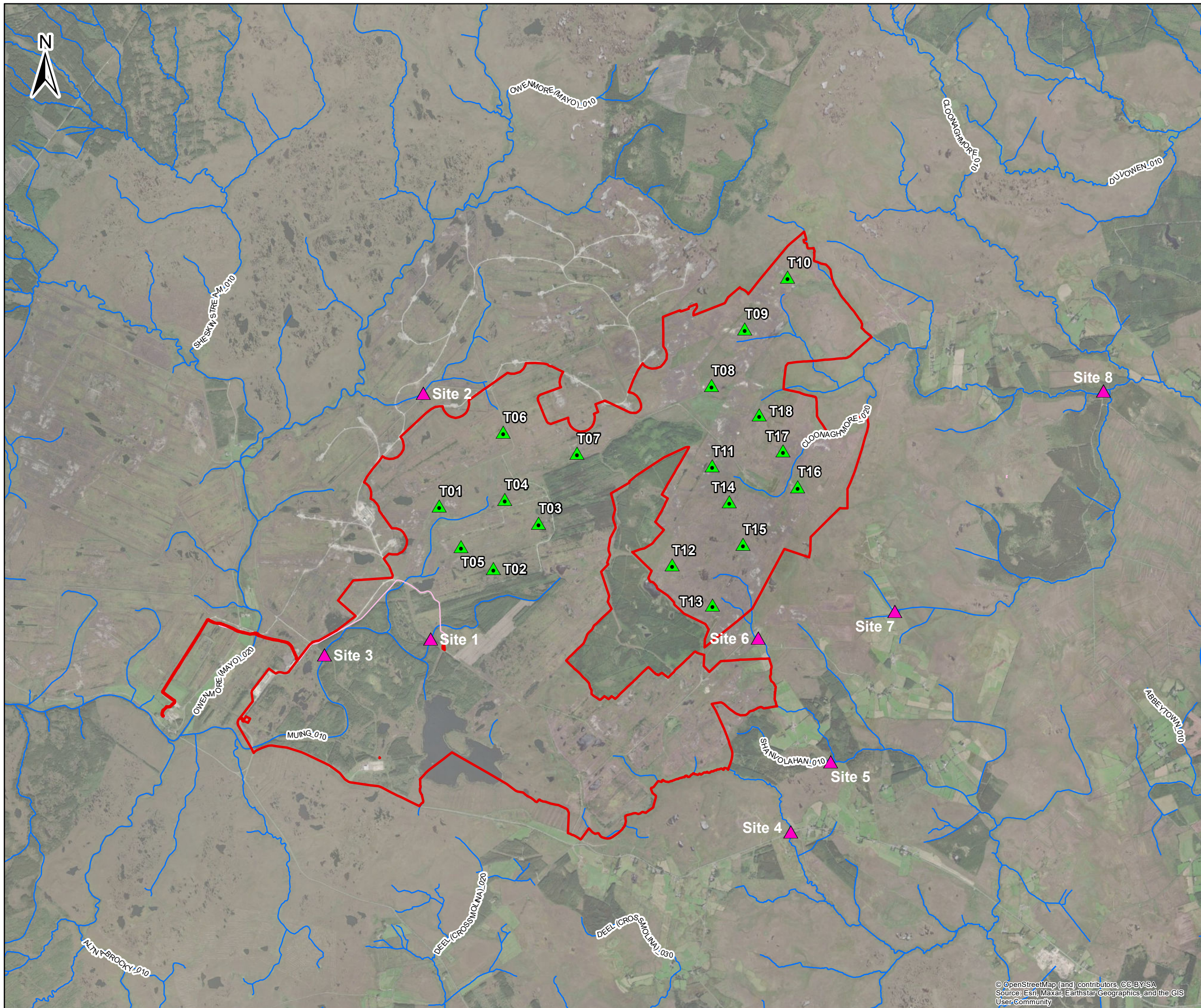
Electro-fishing surveys revealed the stream contained a number of first- and second-year trout and some eel (*Anguilla Anguilla*). This is a good salmonid stream providing a nursery area for trout.

Site 8 - Owenmore (Cloonaghmore)

Site 8 on the Owenmore River (WFD code: IE_WE_34C030100), is a medium lowland depositing watercourse. It is located to the northeast of the proposed development site, outside the site boundary, c. 2.9km from the nearest turbine (T10). The bank width was 10m with a wet width of 9m and an average water depth of 30cm. There was a moderate flow at the time of surveying and had a good mixture glides, deep pools, pools and riffles. The substrata is comprised of boulders, gravels and cobbles. The banks were steep with some areas undercut. Riparian vegetation consisted of willowherb, bent grasses, gorse and ragwort. Instream macrophyte cover was low.

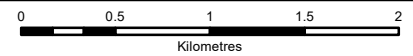
The watercourse was noted as having potential for salmonid spawning due to good flow and the presence of some suitable spawning gravels. There is potential for lamprey habitat due to good gravels and some overhanging banks. Potential crayfish habitat was also recorded in the form of boulders and cobbles and overhanging banks.

Electro-fishing surveys revealed the stream contained a number of first- and second-year salmon and trout with some eel and minnow present. This is an important salmonid stream particularly for salmon.



Legend

- Planning Application Boundary
- ▲ Aquatic Survey Locations
- ▲ Proposed Turbine Locations
- Grid Connection Route
- Rivers



- NOTES**
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
 2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
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Issue	Date	Description	By	Chkd.
D02	22/03/2023	Draft issue	S.P.	J.D.
D01	01/02/2023	Draft issue	S.P.	J.S.

Client: **Bord na Móna**

Project: Oweninny Wind Farm Phase 3

Title: **Figure 7-7: Aquatic Survey Sites**

Scale @ A3: 1:40,000

Prepared by: S.Pezzetta Checked: J.Sherry Date: March 2023

Project Director: D.Grehan

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Draft: **D02**

10889-001-S.BO-Aq.Loc-TOB-D02

7.7.2.4 Key Ecological Receptor Summary

Following a review of the existing environment presented above, it is possible to determine KERs that occur within the proposed development area that require consideration regarding potential effects and mitigation. These include specific receptors that have been identified as being of Local Importance (Higher Value) or greater as per (NRA, 2009)².

They include specific habitats and species with high protection or conservation status. These identified KERs may potentially be impacted by works associated with the proposed development and are therefore taken forward in this report for evaluation and appropriate mitigation (as required). The significance of each habitat/species as it occurs on the site is presented in Table 7-14 below along with the rationale for its selection/exclusion as a KER.

Table 7-14: Evaluation of KERs and Locations within/adjacent to the Proposed Development Site

Site/Feature	NRA Evaluation*	KER	Rationale for inclusion as KER
Dystrophic lakes (FL1)	Local (Higher Value) to National Importance	Yes	This habitat occurs within the proposed development site, but not in close proximity to the proposed infrastructure (the nearest proposed infrastructure, an access track, will be located 80m to the south. While the nearest large structure, a turbine hardstand, is located 130m to the west) and could potentially be indirectly impacted by the proposed construction works. It also corresponds with an Annex I habitat with designated sites containing this habitat in the area.
Acid oligotrophic lakes (FL2)	International Importance	Yes	This habitat occurs within the proposed development site in the form of, Lough Dahybaun SAC. However, it is not in close proximity to the proposed infrastructure, The nearest proposed infrastructure to this SAC, is an existing access track, which will be located 360m to the north. The nearest large structure will be a proposed substation located 470m to the north) and could potentially be indirectly impacted by the proposed construction works. It also corresponds with an Annex I habitat.
	Local Importance (Higher Value)	Yes	This habitat occurs at a number of locations within the proposed development site and could potentially be indirectly impacted. The nearest proposed infrastructure is an access track located 10m to the south and the nearest large infrastructure is a peat deposition area located approximately 10m to the north and south of the habitat.
Eroding/upland rivers (FW1)	County Importance	Yes	This habitat occurs within the proposed development site and could potentially be indirectly impacted. This habitat provides spawning and nursery habitats for salmonids,

Site/Feature	NRA Evaluation*	KER	Rationale for inclusion as KER
			crayfish and lamprey. These rivers also form tributaries to larger watercourses located offsite, including the Oweninny River (an important salmonid river) and the River Deel (which has a population of freshwater pearl mussel <i>Margaritifera margaritifera</i>).
Depositing/ lowland rivers (FW2)	County Importance	Yes	This habitat occurs within the proposed development site and could potentially be indirectly impacted. This habitat provides spawning and nursery habitats for salmonids, crayfish and lamprey. These rivers also form tributaries to larger watercourses located offsite, including the Oweninny River (an important salmon river) and the River Deel (which has a population of freshwater pearl mussel).
Dry siliceous heath (HH1)	Local Importance (Higher Value)	Yes	This habitat occurs within the proposed development site and could potentially be directly impacted as it is located in an area marked for a borrow pit. The areas of this habitat did not correspond to the Annex I habitat European dry heath due to the lack of certain indicator species.
Wet heath (HH3)	Local (Higher Value) to County Importance	Yes	This habitat occurs within the proposed development site and will be directly impacted. The majority of the areas of this habitat, do not corresponded to the Annex I habitat European wet heath, as they do not contain key identifier species or are too degraded.
	National Importance	Yes	This habitat occurs within the proposed development site but not in close proximity to the proposed infrastructure, (the nearest being approximately 200m from proposed infrastructure. It could potentially be indirectly impacted by the proposed construction works. Some discrete areas of this habitat, located to the north, east and southwest of the site corresponded to the Annex I habitat European wet heath. This Annex I habitat is also known to occur in the wider area.
Lowland blanket bog (PB3)	Local Importance (Higher Value)	Yes	This habitat occurs within the proposed development site and will be directly impacted. Some areas of this habitat (mostly to the northwest of the site) were assessed as Local Importance (Higher Value) as they had evidence of historic drainage which could benefit from peat dam blocking or had connection to other higher quality bogs.
	National Importance	Yes	This habitat occurs within the proposed development site but not in close proximity to the proposed infrastructure. It could potentially be indirectly impacted by the proposed construction works. Some areas of this habitat (confined to the east and northeast) have experienced past drainage, but drains have been blocked in recent years and are showing signs of bog flora regeneration, other areas have avoided past peat extraction activities

Site/Feature	NRA Evaluation*	KER	Rationale for inclusion as KER
			and have well developed blanket bog vegetation. These areas along the north-eastern and eastern edges of the site boundary, are directly adjacent to the Bellacorick Bog Complex SAC, where high quality open bog habitat can be seen.
Cutover blanket bog (PB4)	Local Importance (Higher Value)	Yes	This habitat occurs within the proposed development site and will be directly impacted. Some areas of cutover bog (where peat extraction ceased earlier) the vegetation regeneration has developed enough to cover the peat, leaving very few bare areas. These have also remained wet as a result of drain blocking and are typically found near remnant blanket bog areas.
Poor fen and flush (PF2)	Local Importance (Higher Value)	Yes	This habitat occurs within the proposed development site (the nearest proposed infrastructure, a turbine hardstand, is located approximately 65m away from this habitat) and could potentially be indirectly impacted by the proposed construction works.
Transition mire and quaking bog (PF3)	National Importance	Yes	This habitat occurs within the proposed development site (the nearest proposed infrastructure, an access track, will be 80m to the south. The nearest large structure will be a proposed substation located 145m to the northwest) and could potentially be indirectly impacted by the proposed construction works. It also corresponds with an Annex I habitat.
Bog Woodland (WN7)	Local Importance (Higher Value)	Yes	This habitat occurs within the proposed development site but not in close proximity to the proposed infrastructure (the nearest proposed infrastructure, a turbine hardstand, is approximately 120m to the west of this habitat). It could potentially be indirectly impacted by the proposed construction works. This bog woodland was assessed as being of Local importance (Higher Value), due to its size and species composition and it does not correspond with any Annex I habitats. This habitat occurs within the main development site and could potentially be indirectly impacted by the proposed construction works.
Scrub (WS1)	Local Importance (Higher Value)	Yes	This habitat occurs within the proposed development site and will be directly impacted. Scrub habitats were assessed as being of Local Importance (Higher Value) due to the moderate ecological value the habitats provides and its rarity within the greater area.
Bats spp.	Local Importance (Higher Value)	Yes	Locally important populations of bat species protected under Annex IV of EU Habitats Directive and under the Wildlife Acts were recorded at the site. Potential for impacts to the local bat population.
Otter	International Importance	Yes	Evidence of otter was recorded from within the proposed development site. Due to proximity to the Owenduff/Nepin Complex SAC and the River Moy SAC, for which otter is a Qualifying Interest,

Site/Feature	NRA Evaluation*	KER	Rationale for inclusion as KER
			the otter population which utilises the proposed development site may be associated with the SAC population. Otters are protected under Annex II and IV of EU Habitats Directive and under the Wildlife Acts. Potential for impacts to the local otter population.
Badger	Local Importance (Higher Value)	Yes	The badger population at the proposed development site is likely to be of local significance. Badger is protected under the Wildlife Acts. Evidence of badger (tracks and snuffle holes) was recorded within the proposed development site, however no setts were recorded within the Zol of the proposed works (i.e. not within 150m of the proposed construction works). Potential for impacts to the local badger population.
Pine Marten	Local Importance (Higher Value)	Yes	Pine marten population at the proposed development site is likely to be of local significance. Pine marten are protected under the Wildlife Acts. Pine marten have been recorded within the proposed development site. There is potential that pine marten may forage/breed within the area and is therefore included on a precautionary basis. Potential for impacts to the local pine marten population.
Red Deer	Local Importance (Higher Value)	Yes	This species is known to have been released within the site in the 1990s and so are not native to the area. Small herds of up to 15 animals may be seen anywhere on the site. As the species is protected under national law, red deer onsite are considered or Local Importance (Higher Value). Potential for impacts to the local red deer population.
Irish Hare	Local Importance (Higher Value)	Yes	The species is widely distributed throughout the entire site. The hares onsite were assessed as being of Local importance (Higher Value) due to them being listed under Annex V of the habitats directive and being protected under the Irish Wildlife Act. Potential for impacts to the local Irish hare population.
Common Frog	Local Importance (Higher Value)	Yes	Evidence of common frog was recorded within the proposed wind farm site boundary. Common frog is categorised as Local Importance (higher value) based on the likelihood that the proposed development site hosts a resident population of the species, which is protected under the Wildlife Acts and the EU Habitats Directive (92/43/EEC). This species is considered to be a KER. Potential for impacts to the local frog population.
Common Lizard	Local Importance (Higher Value)	Yes	Adult and juvenile lizards were recorded within the proposed development site. Lizards are common and widespread in Ireland and the site is likely to provide suitable habitat for a lizard population of local importance (Higher Value). The species is protected under the Wildlife Acts. Potential for impacts to the local lizard population.
Salmon	County	Yes	The rivers and watercourses within and

Site/Feature	NRA Evaluation*	KER	Rationale for inclusion as KER
	Importance		immediately adjacent to the proposed development site provide important spawning and nursery habitat for salmon. From the electro-fishing survey carried out, large numbers of juvenile salmon were recorded. These watercourses hold large areas of Salmon spawning and nursery ground. Salmon are protected under Annex II and V of EU Habitats Directive. Potential for impacts to the Atlantic salmon population.
Lamprey species	County Important	Yes	Lamprey species were recorded at survey sites within and immediately adjacent to the proposed development during the electro-fishing surveys. These watercourses provide important spawning and nursery habitat for lamprey, which are protected under Annex II and V of EU Habitats Directive. Potential for impacts to the lamprey population.
Crayfish	County Importance	Yes	Crayfish were recorded at survey sites within and immediately adjacent to the proposed development during the electro-fishing surveys. These watercourses provide important spawning and nursery habitat for Crayfish, which are protected under Annex II and V of EU Habitats Directive. Potential for impacts to the crayfish population.
Marsh Fritillary	Local Importance (Lower Value)	No	A survey for marsh fritillary was undertaken in late August 2020, in areas of suitable habitat/where devils bit scabious was found to be abundant. Two areas were recorded as having good habitat for marsh fritillary (based on NRA 2009b ⁷ guidelines). These areas were located near the eastern edge of the proposed development site. However, no marsh fritillary webs were recorded at both of these locations. Stands of devils bit scabious were also recorded throughout the site, but larval webs were not recorded at these locations. As these suitable areas are located away from any proposed works and infrastructure sites, the species is not considered as KER.

Note: * The evaluation for mammals is informed by protection status and observed numbers (in some cases identified).

7.8 POTENTIAL EFFECTS

The identification and description of effects presented below takes account of the characteristics of the receiving environment as described throughout Section 0 with particular reference to the KERs identified in Section 7.7.2.4. Effects are presented in relation to each phase of the project (construction, operation and decommissioning).

The effects described in this section are those ecological impacts predicted due to the proposed development prior to the consideration of any appropriate mitigation measures (refer to Section 7.10 for further details on mitigation measures). Residual effects describe potential

effects that remain after all assessment and mitigation measures are considered and are discussed in Section 7.12.3.

7.8.1 Do Nothing Effect

If the proposed development were not to proceed then the existing environment would continue to be managed as it is currently and KERs would likely remain as described in the sections above or reflect existing regional, national or global trends.

7.8.2 Effects on Designated Sites

Potential effects on Natura 2000 sites are addressed in the Screening for AA and NIS reports which accompany this planning application. The Screening for AA Report investigated the potential for the proposed development to have significant effects on European Site(s), either alone or in-combination, with other plans or projects. The AA Screening Report concluded that:

*“The nature of the proposed development, the proximity of European sites, the application of the precautionary principle and in the absence of mitigation measures, that **there is potential for significant impacts** on six European sites:*

- *Lough Dahybaun SAC,*
- *River Moy SAC,*
- *Owenduff/Nephin Complex SAC,*
- *Lough Conn and Lough Cullin SPA and*
- *Killala Bay/Moy Estuary SPA*
- *Blacksod Bay/Broad Haven SPA.”*

A NIS was therefore prepared to assess the potential for adverse effects on the integrity of the site concerned in view of their conservation objectives. The NIS concludes the following.

“In the absence of mitigation, the potential risks to the Lough Dahybaun SAC, River Moy SAC, Owenduff/Nephin Complex SAC, Lough Conn and Lough Cullin SPA, Killala Bay/Moy Estuary and the Blacksod Bay/Broad Haven SPA is a potential degradation of habitat quality from the release of suspended solids, pollutants and/or the disturbance to Annex species as a result of construction, operational and decommissioning works.

Following an analysis and evaluation of the relevant information and in light of best scientific knowledge, in particular, the nature of the proposed development, characteristics of the qualifying and special conservation interests, the potential link between the Proposed Development and the identified Natura 2000 sites and the mitigations measures to be implemented. It can be concluded that no significant adverse effects are anticipated alone or in-combination with any other plans or projects on the following European sites: Lough Dahybaun

SAC, River Moy SAC, Owenduff/Nephin Complex SAC, Lough Conn and Lough Cullin SPA, Killala Bay/Moy Estuary SPA and Blacksod Bay/Broad Haven SPA”.

7.8.3 Effects on Habitats

7.8.3.1 Construction Phase

7.8.3.1.1 Habitat Loss (Direct Effects)

The construction of the proposed wind farm and its associated infrastructure will result in a direct effect on habitats in the form of habitat loss. It is calculated that c.93.3ha of habitat will be lost as a result of the proposed infrastructure. A summary of the approximate habitat loss from the proposed development can be seen in Table 7-15.

The proposed development is primarily restricted to highly modified and altered habitats of low ecological importance (non-recolonised cutover bog) that were not considered to be KERs. KER habitats within the proposed development footprint include; upland/eroding rivers (FW1), depositing/lowland rivers (FW2), dry siliceous heath (HH1), wet heath (HH3), lowland blanket bog (PB3), cutover bog (PB4) (with good recolonisation and water retention) and scrub (WS1). There will be no direct loss of any Annex I habitat from the proposed development. Three habitats which have the potential to correspond with Annex I habitat (dry siliceous heath, wet heath and lowland blanket bog), did not conform with the vegetation communities or physical characteristics of their annex habitats or were too degraded.

No instream works are proposed as part of the development and therefore, there will be no loss of eroding/upland rivers (FW1) and depositing/lowland rivers (FW2) habitat.

In the absence of any mitigation and compensatory³⁹ measures proposed, the temporary loss of habitats associated with the proposed construction phase is assessed as **Short Term, Slight Negative Effect** at a local geographic scale.

In the absence of any mitigation and additional measures proposed, the loss of vegetation which will not be replanted (i.e. vegetation located at the proposed hardstanding areas and along access tracks) during the construction phase is assessed as **Permanent, Slight Negative Effect** at a local geographic scale.

³⁹ These are not compensatory measures in the context of the requirements of Article 6(4) of the Habitats Directive. They are not compensating for an impact that would adversely affect the integrity any European Site.

Table 7-15: Approximate Loss of Habitats Arising from the Proposed Development

Habitats	Proposed Infrastructure components (ha)								Total Area (ha)
	Amenity Walkway	Borrow Pit Areas	Cable Route	Construction Compounds	Peat Deposition Areas	Proposed Roads	Substation	Turbine Hardstands	
BL3 - Buildings and artificial surfaces	0.671	0.623	0.203	0.836	-	3.933	0.067	0.017	6.349
FL8 - Other artificial lakes and ponds	-	-	-	-	-	0.040	-	-	0.040
GA1 - Improved agricultural grassland	-	-	0.031	-	-	-	-	-	0.031
GS2 - Dry meadows and grassy verges	-	0.021	-	-	-	0.048	-	-	0.069
GS3 - Dry humid acid grassland	-	-	-	-	-	0.037	-	-	0.037
GS4 - Wet grassland	0.122	0.005	0.081	0.109	0.008	0.587	0.926	-	1.837
HH1 - Dry siliceous heath (non-Annex)	-	2.492	-	0.005	0.013	0.018	-	-	2.529
HH3 - Wet heath (non-Annex)	0.000	-	-	0.033	1.796	0.180	-	-	2.010
PB3 - Lowland blanket bog (non-Annex)	0.002	0.936	0.037	-	0.079	0.832	0.636	0.210	2.733
PB4 - Cutover bog	0.590	39.696	0.665	0.463	17.406	7.596	-	9.034	75.450
WS1 - Scrub	0.004	-	-	0.141	-	0.018	-	-	0.162
WS2 - Immature woodland	-	-	-	-	1.599	0.051	-	0.423	2.073
Total Area (ha)	1.389	43.774	1.017	1.586	20.902	13.340	1.629	9.683	93.320

7.8.3.1.2 *Habitat Degradation (Indirect Effects)*

No instream works will occur during the proposed construction works but a small eroding/upland river (FW1), will need to be crossed at two locations to facilitate access tracks to turbines 14 and 16. The access tracks are crossing the same first order stream at two separate locations. It is proposed that these crossings will be done using a clear-span bridge (details on clear span bridges can be found in Chapter 3 of this EIAR). There is potential for the construction activities to result in the runoff of construction pollution and/or sediment into the nearby waterbodies if not appropriately managed.

The Muing River and its tributaries traverses through the southwestern section of the proposed development site and is located in close proximity to the proposed substation (c.100m) and to the grid connection route (c.1m in places). There are also a number of drainage ditches located throughout the proposed development site, in close proximity to the proposed construction works. In addition, the proposed grid connection works will also include construction works located in close proximity to the Oweninny River. Due to the proximity of the construction works to watercourses, the possibility of water quality impacts cannot be ruled out in the absence of mitigation.

The release of construction pollution and/or sediment into watercourses has the potential to negatively degrade the watercourse habitats resulting in **Temporary, Moderate Negative Effects** on the Muing and Oweninny rivers and other watercourses located within the proposed development site during the construction phase.

The spread of invasive species onsite (rhododendron) has the potential to outcompete other floral species reducing the diversity of habitats. The transport of material, disturbance of ground (providing areas for invasive species germination) and the movement of machinery or personnel all have the risk of spreading invasive species. This could result in a **Long Term, Significant Negative Effects** on KER habitats within the site boundary, notably the bog habitats.

Excavation activities may also result in the temporary generation of dust in the locality of the works area which could lead to dust deposition on vegetation which can inhibit plant growth. The Institute of Air Quality Management provide guidelines; (Holman *et al.*, 2014)⁴⁰, which prescribes potential dust emission risk classes to ecological receptors. Following the guidelines

⁴⁰ Holman, C., Barrowcliffe, R., Birkenshaw, D., Dalton, H., Gray, G., Harker, G., & Vining, L. (2014). IAQM Guidance on the Assessment of Dust from Demolition and Construction. *Institute of Air Quality Management, London* (accessed 11.03. 14). www.iaqm/wpcontent/uploads/guidance/dust_assessment.pdf.
http://iaqm.co.uk/wpcontent/uploads/guidance/iaqm_guidance_report_draft1.4.pdf.

and considering the size of the proposed development, the scale of the earthworks was considered 'Large' (total site area >10,000m²). The guidelines specify that receptor sensitivity is 'High' up to 20m from the source and reduces to 'Medium' at 50m. Dust may also be generated from track out due to heavy duty vehicle (HDV) movements from the site entrance. It is anticipated that HDV movement will range between 10-50 outward movements a day which equates to 'Medium' track out movement. The guidelines indicate that 'Medium' track out equates to dust occurring between 50-100m from the site.

There is potential that surrounding habitats of local to international importance may be impacted by the generation of dust. The deposition of dust on flora or habitats can inhibit effective photosynthesis and transpiration. Dust impacts are likely to result in a **Short Term, Slight, Negative Effect** on the receiving biodiversity at a local geographic scale.

7.8.3.2 Operational Phase

There will be no loss of habitats associated with the proposed development during the operational phase. During windfarm operation, maintenance activity will be infrequent and low intensity, such maintenance activities will be confined to turbine locations, substations and other hardstanding infrastructures and will not require any additional habitat clearance. **Significant Negative Effects on habitats are not anticipated** during the operational phase.

7.8.3.3 Decommissioning Phase

No additional loss of habitats are proposed as part of the decommissioning phase. There is likely to be some reinstatement of habitats which were lost during the decommissioning phase. Turbine foundations would remain *in-situ* and will be covered with earth, which would be allowed to reseed and revegetate naturally, therefore, there would be a net habitat gain, and disturbances would be minimised with access tracks and hardstanding already in place. **Significant Negative Effects on habitats are not anticipated** during the decommissioning phase.

7.8.4 Effects on Fauna

7.8.4.1 Otter: Disturbance/displacement

7.8.4.1.1 Construction Phase

Excavation works can result in disturbance impacts of active breeding otter holts to a distance of up to 150m, as per the NRA guidelines (NRA, 2008)⁵. A number of waterbodies were recorded within the proposed development site which included streams, drainage ditches and lakes.

Signs of otter (which included live sightings) were recorded in two locations in proximity to waterbodies, within the proposed development site. It is likely that otters may commute and forage along the rivers, streams and drains onsite. Although, no otter holts or resting sites were identified within the Zol of the proposed development during the surveys, there is potential that the proposed construction works within the main proposed development site may result in the disturbance of otter when foraging or commuting nearby.

The construction of the proposed grid connection route which crosses the Oweniny River at one location also has the potential to result in disturbance to otter. No evidence of otter was recorded upstream and downstream of the proposed crossing point either during multi-disciplinary surveys or following the desktop review (NBDC database⁴¹), but the river has the potential to support the species.

The majority of construction activities will take place during daylight hours, thereby avoiding disturbance to nocturnal fauna. The proposed works will be temporary in nature and are unlikely to displace otter in the medium or long-term. There is potential however that some temporary construction lighting may be required outside of daylight hours during the construction works. Direct lighting on a holt or along river corridor may disturb otter within the area.

In the absence of mitigation measures, the disturbance/displacement associated with the proposed construction phase is assessed as **Short Term, Slight Negative Effects** on the otter population at a local to international scale.

7.8.4.1.2 Operational Phase

During the operational phase the level of operational traffic and ongoing maintenance is expected to be low.

Permanent external lighting will be installed at the substation building which may potentially shine on the small Muingaleeaun Stream which is situated approximately 100m from the proposed substation. The external lighting will be automatic with motion detection to provide lighting when site personnel are onsite. Lighting will therefore only be activated when the site is manned.

⁴¹ <https://maps.biodiversityireland.ie/Map>

It is considered that any disturbance during the operational phase would **not result in any Significant Negative Effects** on the local otter population.

7.8.4.1.3 Decommissioning Phase

Decommissioning phase effects will be similar to the construction phase but the potential for impacts considerably less. Decommissioning of the proposed development would result in the cessation of renewable energy generation, the removal of turbines, and the potential (though unlikely) removal of other infrastructural elements and any effects would be short-term in duration.

Taking a precautionary approach and in the absence of mitigation measures, disturbance / displacement associated with the proposed decommissioning phase is assessed as **Short Term, Significant Negative Effects** on the local otter population.

7.8.4.2 Otter: Habitat Degradation

7.8.4.2.1 Construction Phase

Construction works at the proposed development site have the potential to result in indirect effects on aquatic habitat which supports otter and the availability of prey items. These effects are likely to be short-term in duration and include deterioration of water quality due to sediment release during the excavation of turbine foundations, hardstanding areas, borrow pits, substation, internal access tracks, grid connection cabling or potential contamination of water from concrete and/or fuels during construction.

In the absence of mitigation measures to protect aquatic environments within the site, habitat degradation of otter associated with the proposed construction phase of the development is assessed as having **Short Term, Significant Negative Effect** on the otter population at a local up to international geographic scale in the case of otter within protected European SAC's downstream of the proposed development.

7.8.4.2.2 Operational Phase

During the operational phase there will be no direct discharges from the proposed development to the surface water environment. There may be occasional maintenance/site visits to the windfarm site during its operation. There is potential that the movement of vehicles/machinery within the proposed development site may result in leaks/spills of hydrocarbons/oils etc. If not

appropriately managed, which may result in slight temporary, localised impacts of nearby watercourses.

Habitat degradation of otter associated with the operational phase is assessed as **Long Term, Slight Negative Effect** at a local up to international geographic scale in the case of otter within protected European SAC's downstream of the proposed development.

7.8.4.2.3 Decommissioning Phase

Decommissioning phase effects will be similar to the construction phase but the potential for impacts considerably less. Decommissioning of the proposed development would result in the cessation of renewable energy generation, the removal of turbines, and the potential (though unlikely) removal of other infrastructural elements and any effects would be short-term in duration.

In the absence of mitigation measures to protect aquatic environments within the site, habitat degradation of otter associated with the proposed decommissioning phase is assessed as **Short Term, Slight Negative Effect** at a local up to international geographic scale in the case of otter within protected European SAC's downstream of the proposed development.

7.8.4.3 Badger: Disturbance/displacement and Habitat Loss

7.8.4.3.1 Construction Phase

Excavation works can result in disturbance impacts for breeding badgers to a distance of up to 50m from their sett, and this increases to 150m for piling as per NRA guidelines (NRA, 2008¹⁹). There were no setts recorded within 150m of turbine bases, where piling may be required. There will be no disturbance of known badger setts within the area. A small number of badger signs were recorded to the northern end of the proposed development site, within the site boundary and these were confined to edges of forestry habitats, the nearest field sign being c. 600m from Turbine 11. The large cutover bog habitats within the proposed development site was not recorded as providing suitable foraging habitat for the species.

Increased levels of activity during the construction phase may result in disturbance to the species which may forage near forestry. The disturbance however will be temporary and unlikely to be significant, as badger are crepuscular in nature, avoiding the main periods of construction activity.

The majority of construction activities will take place during daylight hours, thereby avoiding disturbance to nocturnal fauna. There is potential however that some temporary construction lighting may be used outside of daylight hours, during the construction works. Direct lighting on setts or on potential foraging sites may disturb badger activity within the area. Similarly, this impact to badger is likely to be temporary.

The proposed development will result in the loss of approximately 93.3ha of habitat. While not all of the habitats to be removed were recorded to be suitable foraging habitat (bare cutover bog, small artificial lakes/ponds) for the local badger population in the area, other areas do have potential and will be lost. The habitats proposed to be lost however are common and widespread in the surrounding area and suitable habitat for the local badger population is abundant in the surrounding landscape.

Disturbance/displacement of badger associated with the proposed construction phase is assessed as **Short Term, Slight Negative Effect** on the local badger population at a local geographical scale.

7.8.4.3.2 Operational Phase

During the operational phase the level of operational traffic and ongoing maintenance is expected to be sufficiently low.

Permanent external lighting will be installed at the substation building. The external lighting may potentially spill into nearby edges or conifer forestry (nearest forest edge is c. 100m from the proposed substation). The external lighting will be automatic with motion detection to provide lighting when site personnel are onsite. Lighting will therefore only be activated with the site is manned.

It is considered that any disturbance during the operational phase would **not result in any Significant Negative Effects** on the local badger population at a local geographical scale.

7.8.4.3.3 Decommissioning Phase

Decommissioning phase effects will be similar to the construction phase but the potential for impacts considerably less. Decommissioning of the proposed development would result in the cessation of renewable energy generation, the removal of turbines, and the potential (though unlikely) removal of other infrastructural elements and any effects would be short-term in duration.

Taking a precautionary approach, disturbance/displacement of badger associated with the proposed decommissioning phase is assessed as having **Short Term Slight Negative Effect** on the local badger population at a local geographical scale.

7.8.4.4 Pine Marten: Disturbance/displacement and Habitat Loss

7.8.4.4.1 Construction Phase

Pine marten have previously been recorded within the proximity to the proposed development site. There will be no requirement to fell forestry as part of the proposed development and therefore there is no potential for disturbance and displacement effects of the species.

Due to the limited pine marten activity encountered during the surveys within the proposed development site boundary and the abundant availability of forestry habitat in the surrounding area, disturbance/displacement associated with the proposed construction phase is assessed as a potential **Temporary, Slight Negative Effect** on the local pine marten population at a local geographical scale.

7.8.4.4.2 Operational Phase

During the operational phase the level of operational traffic and ongoing maintenance is expected to be sufficiently low. **Significant Negative Effects are not anticipated** during the operational phase.

Permanent external lighting will be installed at the substation building. The external lighting may potentially spill into nearby edges or conifer forestry (nearest forest edge is c.100m from the proposed substation). The external lighting will be automatic with motion detection to provide lighting when site personnel are onsite. Lighting will therefore only be activated with the site is manned.

It is considered that any disturbance during the operational phase would not result in any **Significant Negative Effects** on the local pine marten population at a local geographical scale.

7.8.4.4.3 Decommissioning Phase

Decommissioning phase effects will be similar to the construction phase but the potential for impacts considerably less. Decommissioning of the proposed development would result in the cessation of renewable energy generation, the removal of turbines, and the potential (though unlikely) removal of other infrastructural elements and any effects would be short-term in

duration. No additional removal of forestry would be necessary as part of the decommissioning phase. **No negative effects** are anticipated on the local pine marten population during the decommissioning phase.

7.8.4.5 Red Deer: Disturbance/displacement and Habitat Loss

7.8.4.5.1 Construction Phase

Red deer have been recorded within the proposed development site, largely within the forestry within the proposed development site and in the open bog habitat. There will be no requirement to fell forestry as part of the proposed development and the areas of open bog habitat that will be removed as part of the proposed development will constitute a small area relative to the overall size of bog available at the site. The increase in construction personnel and machinery will increase the disturbance to the species.

Due to the abundant availability of forestry and open bog habitat in the surrounding area, disturbance/displacement and habitat loss associated with the proposed construction phase would result in **Short-term Imperceptible Negative Effects** on the local red deer population at a local geographical scale.

7.8.4.5.2 Operational Phase

During the operational phase the level of operational traffic and ongoing maintenance is expected to be low. Maintenance activity will be confined to the turbine locations, substations and other hardstanding infrastructure, for this reason, it is considered that any disturbance during the operational phase would **result in Long-term Imperceptible Negative Effects** on the local red deer population.

7.8.4.5.3 Decommissioning Phase

Decommissioning phase effects will be similar to the construction phase but the potential for impacts considerably less. Decommissioning of the proposed development would result in the cessation of renewable energy generation, the removal of turbines, and the potential (though unlikely) removal of other infrastructural elements and increase in personnel but any effects would be short-term in duration. Therefore, it is considered that any disturbance during the proposed decommissioning phase would **result in Short-term Imperceptible Negative Effects** on the local red deer population.

7.8.4.6 Irish Hare: Disturbance/displacement and Habitat Loss

7.8.4.6.1 Construction Phase

Irish hare have been recorded within the proposed development site, largely within the open bog habitat. There will be a requirement to remove some areas of open bog habitat as part of the proposed development, but this will constitute a small area relative to the overall size of bog available at the site. The increase in construction personnel and machinery will increase the disturbance to the species.

Due to the abundant availability of forestry and open bog habitat in the surrounding area, disturbance/displacement and habitat loss associated with the proposed construction phase is assessed as having **no potential for Significant Negative Effects** on the local Irish hare population.

7.8.4.6.2 Operational Phase

During the operational phase the level of operational traffic and ongoing maintenance is expected to be low.

It is considered that any disturbance during the operational phase would **not result in any Significant Negative Effects** on the local Irish hare population.

7.8.4.6.3 Decommissioning Phase

Decommissioning phase effects will be similar to the construction phase but the potential for impacts considerably less. Decommissioning of the proposed development would result in the cessation of renewable energy generation, the removal of turbines, and the potential (though unlikely) removal of other infrastructural elements and increase in personnel but any effects would be short-term in duration. **No Significant Effects** anticipated as a result of the proposed decommissioning phase.

7.8.4.7 Bats: Direct and Indirect Effects

7.8.4.7.1 Construction Phase

7.8.4.7.1.1 Habitat Loss/Roost Loss

Six active bat roosts sites were identified within the proposed development site. One was located to the north of the site in an old disused toilet block, and the remaining roosts are located to the south of the proposed development site, in an old farm shed, the new interpretive centre

and the existing Bord na Móna depot. None of the above-mentioned buildings will be demolished as part of construction works. The proposed works will not result in the loss of any existing bat roosts.

Only small areas of suitable foraging habitat is due to be removed as part of construction works, but no forestry will be removed.

Therefore, loss of suitable foraging and commuting habitat will be negligible, and will result in a **Temporary, Slight, Negative Effect** on the local bat population, at a local geographical scale.

7.8.4.7.1.2 Disturbance from Temporary Construction Lighting

It is likely that temporary construction lighting will be used within the construction works associated with the proposed development. Lighting can impact bats' roosting sites, commuting routes and foraging areas (Bat Conservation Ireland, 2010⁴²). The projection of light on roosts or foraging sites can result in the change of feeding/commuting behaviour of bats in the area. Impacts from temporary lighting on bats would result in a **Temporary, Slight, Negative Effect** on the local population of bats on site during the construction phase at a local geographical scale.

7.8.4.7.2 Operational Phase

7.8.4.7.2.1 Habitat Loss/Roost Loss

There will be no habitat loss associated with the operation of the wind farm. **No Significant Effects** on the local bat population are anticipated during the operational phase.

7.8.4.7.2.2 Collisions

Collision risk is a potential issue in relation to bats, with certain species being at greater risk due to their flight characteristics and foraging habitats.

Bat activity around the turbine locations was predominantly low with medium to high levels of activity recorded at some turbines, specifically for Leisler's bat, common pipistrelle, soprano pipistrelle and Natusius' pipistrelle around Turbine 1, 2, 3, 4, 7, 17 and 18. More details on the bat species recorded within the site can be seen in **Error! Reference source not found.**

In the absence of mitigation measures, the potential for death by collision or disturbance on the local bat population as a result of the operation of turbines is considered to be **Long Term**

⁴² Bat Conservation Ireland (2010) Bats & Lighting, Guidance Notes for: Planners, engineers, architects and developers.

Moderate Negative Effect on the local bat populations within the site, during the operational phase.

7.8.4.7.2.3 Lighting Disturbance

Permanent external lighting will be installed at the substation building. Bats species were recorded commuting in these areas following field surveys as detailed in section 7.7.2.2.1 and Appendix 7.2. The external lighting will be automatic with motion detection to provide lighting when site personnel are onsite. Lighting will therefore only be activated when the site is manned.

Impacts from proposed substation lighting on bats would result in a **Brief, Slight Negative Effect** on the local population of bats on site during the operational phase.

7.8.4.7.3 Decommissioning Phase

Decommissioning phase effects will be similar to the construction phase but the potential for impacts is considerably less. Decommissioning of the proposed development would result in the cessation of renewable energy generation, the removal of turbines, and the potential (though unlikely) removal of other infrastructural elements and any effects would be short-term in duration. No removal of vegetation is required as part of the decommissioning phase.

No Negative Effects are anticipated during the decommissioning phase.

7.8.4.8 Watercourses (Aquatic fauna): Habitat Degradation

7.8.4.8.1 Construction Phase

No instream works are proposed as part of the proposed development, however watercourse crossings will be required in order to facilitate the grid connection, and access roads. The grid connection will cross the Oweninny River using an existing bridge, where it will be attached to the side of the structure, the access tracks over watercourses will be constructed via a clear-span bridge. No new crossings of the river Muing or other EPA rivers will be required

The proposed construction works within the proposed development site and construction works associated with the proposed grid connection are located in close proximity to a number of watercourses and have the potential to result in indirect effects on protected aquatic species such as Atlantic salmon, white-clawed crayfish and lamprey species due to a degradation in water quality. During the ecological surveys suitable habitat to support protected aquatic

species was recorded within the watercourses located within the footprint of the proposed development site and in watercourse adjacent to the site. The release of construction pollution and/or sediment into the watercourses has the potential to degrade water quality indirectly impacting these aquatic species and their habitats. Sedimentation can degrade suitable spawning habitats by infiltrating clean gravel beds. A reduction of suitable spawning beds within the watercourse has the potential to reduce carrying capacity of the aquatic species, such as Atlantic salmon, lamprey species, other fish species and crayfish within the watercourse, potentially affecting populations both upstream and downstream. In addition, the prolonged sediment loading of a watercourse has the potential to inhibit fish passage. The release of concrete into a watercourse has the potential to alter pH levels of the waterbody and is highly toxic to aquatic life.

In the absence of mitigation measures, indirect effects, as a result of habitat degradation on aquatic fauna, within watercourses located within the Zol of the proposed development, during the construction phase will result in **Temporary, Significant Negative Effects** on the aquatic fauna populations both upstream and downstream of the impacted watercourses.

7.8.4.8.2 Operational Phase

During the operational phase there will be no direct discharges from the proposed development to the surface water environment however there may be occasional maintenance/site visits to the windfarm site during its operation. There is potential that the movement of vehicles/machinery within the site may result in leaks/spills of hydrocarbons/oils etc. if not appropriately managed, which may result in slight temporary, and localised impacts of nearby watercourses.

Indirect effects on aquatic fauna, within watercourses located within the Zol of the proposed development, during the operational phase is assessed as **Long Term, Slight Negative Effect** on aquatic fauna populations.

7.8.4.8.3 Decommissioning Phase

Decommissioning phase effects will be similar to the construction phase but the potential for impacts considerably less. Decommissioning of the proposed development would result in the cessation of renewable energy generation, the removal of turbines, and the potential (though unlikely) removal of other infrastructural elements and any effects would be short-term in duration.

Habitat degradation of watercourses associated with the proposed decommissioning phase is assessed as **Short Term Moderate Negative Effect**.

7.8.4.9 Common frog: Disturbance/displacement and Habitat Loss

7.8.4.9.1 Construction Phase

A number of drainage ditches will be crossed as part of the proposed development, but this will constitute a small area relative to the overall length of drainage ditches available at the site.

There will be no significant loss of common frog habitat as a result of the proposed development and abundant suitable supporting habitat for the species occurs throughout the surrounding area. **Temporary, Slight Negative Effect** on the local population of common frog within the site, are anticipated as a result of the proposed construction phase.

7.8.4.9.2 Operational Phase

The operational phase will not result in any loss of frog habitat. **No effects** are anticipated during the operational phase.

7.8.4.9.3 Decommissioning Phase

Decommissioning phase effects will be similar to the construction phase, but the potential for impacts considerably less. Decommissioning of the proposed development would result in the cessation of renewable energy generation, the removal of turbines, and the potential (though unlikely) removal of other infrastructural elements and any effects would be short-term in duration. **Significant Negative Effects are not anticipated** on the local population of common frog within the site, as a result of the proposed decommissioning phase.

7.8.4.10 Common Lizard: Disturbance/displacement and Habitat Loss

7.8.4.10.1 Construction Phase

This species was most commonly encountered in open bog habitats. Areas of bog habitat will be removed as part of the proposed development, but this will constitute a small area relative to the overall size of bog available at the site.

There will be no significant loss of common lizard habitat as a result of the proposed development and abundant suitable supporting habitat for the species occurs throughout the

surrounding area. **Significant Effects are not anticipated** on the local population of common lizard within the site, as a result of the proposed construction phase.

7.8.4.10.2 Operational Phase

The operational phase will not result in any loss of common lizard habitat. **No effects** are anticipated during the operational phase.

7.8.4.10.3 Decommissioning Phase

Decommissioning phase effects will be similar to the construction phase but the potential for impacts considerably less. Decommissioning of the proposed development would result in the cessation of renewable energy generation, the removal of turbines, and the potential (though unlikely) removal of other infrastructural elements and any effects would be short-term in duration. **Significant Negative Effects are not anticipated** on the local population of common lizard within the site, as a result of the proposed decommissioning phase.

7.9 CUMULATIVE EFFECTS

Information on the relevant projects within the vicinity of the proposed development is described in Chapter 5 of this EIAR (Planning). The information was sourced from a search of the local authorities planning registers, EPA website, planning applications, EIAR documents and planning drawings which facilitated the identification of past and future projects, their activities and their potential environmental impacts. All projects listed in Chapter 5 of this EIAR were reviewed as part of the cumulative effects assessment. Key projects with the potential for cumulative effects are described further below.

7.9.1 Projects

Oweninny Windfarm

The Oweninny Wind Farm Project is being developed by Oweninny Power Ltd. which is comprised of Phase 1 (operational) and Phase 2 (under construction) a joint venture between ESB Wind Development Limited and Bord na Móna Energy Limited, and this Bord na Móna application for the proposed Phase 3. Phase 1 of the Oweninny Wind Farm project, which has been in operation since mid-2019, is located across lands immediately to the northwest of the proposed development site. While Phase 2 of the Oweninny Wind Farm Project, which is currently under construction and expected to be fully operational in early 2023, is located c. 2km west of the proposed development site, to the west of the Oweninny River.

An Environmental Impact Statement (EIS) of the proposed windfarm was prepared by ESB and Bord na Móna in 2013 which included an assessment of potential significant effects from the proposed development on terrestrial and aquatic ecology within the receiving environment. The EIS concluded that the implementation of appropriate mitigation measures will minimise significant ecological impacts and there is no potential for residual impacts.

Sheskin Wind Farm

Sheskin Wind Farm (Mayo Co. Co. Planning reference: 15825) is comprised of 8 wind turbines and associated works, is located approximately 6.5km from the proposed development site. Each turbine will have a maximum overall height of 150m. It was granted conditional planning permission in 2016. An EIAR for this development was produced and concluded that with the implementation of appropriate mitigation measures, the proposed wind farm at Sheskin will have an imperceptible to slight, positive residual impact on the existing environment.

Sheskin South Wind Farm

Sheskin South Wind Farm (An Bord Pleanála Case reference: 315933) is comprised of 21 no. wind turbines and all associated works and is located approximately 6km from the proposed development site. The application for this proposed development was submitted on the 01/03/2023 and no decision has been determined at time of writing (March 2023). An EIAR for this development was produced and concluded that with the implementation of appropriate mitigation measures, the proposed Sheskin South wind farm will have no significant effects on the existing environment including habitats, designated sites, and fauna.

Dooleeg Wind Turbine

Permission for a single wind turbine generator (Mayo Co. Co. Planning Reference: 20467), with an overall max height of 180 metres and 20kV grid connection to Bellacorick 110kV substation. It is located approximately 300m from the proposed development site and was granted conditional permission in 2021. An EIAR have been produced for this proposed development. The EIAR concluded that with the appropriate mitigation measures implemented, the proposed development will not have the potential to result in significant negative residual impacts on have any significant effects to habitats or fauna occurring at or in the wider area of the proposed development.

Glencora Wind Farm

This proposed wind farm, located approximately 12km north of the proposed development site, is currently in the pre-planning stage and will be comprised of 22 no. wind turbines and all associated works⁴³. A pre-application consultation with An Bord Pleanála (Case reference: 310528) for this proposed development was submitted on the 16/06/2023 and no decision has been determined at time of writing (March 2023).

Oweninny Bog Substitute Consent

TOBIN have been commissioned to submit a substitute consent application on behalf of Bord na Móna for the historic peat extraction at Oweninny Bog. Within this application an assessment was carried out on of any likely significant effects on biodiversity as a result of this peat extraction. The proposed development site is located within the boundaries of Oweninny Bog.

A remedial EIAR (rEIAR) has been developed (unpublished TOBIN reports) for the Oweninny Bog, which included an assessment on any likely significant effects from the historic peat extraction on aquatic and terrestrial ecology within the receiving environment.

The rEIAR concluded that the mitigation measures, implemented as part of an Integrated Pollution Control (IPC) license (EPA License number P0505-01), which included measures to mitigate against dust, noise, surface and groundwater effects and a peatland rehabilitation plan, which has been in place since early 2000, will have no long-term residual impacts. The continued natural restoration of the peatlands as a result of the rehabilitation measure will likely contribute to long term positive effects. There will be no overlap between the proposed development and the rehabilitated peatlands as part of the IPC license, therefore no cumulative effects are anticipated.

Mayo Green Hydrogen Production Plant

The development of a hydrogen plant (Mayo Co. Co. Planning Reference: 22502) that will produce hydrogen by the electrolysis of water, is proposed at a site approx. 1km from the Phase 3 site boundary. The hydrogen produced will be stored on site and available for Injection into the transmission gas network or the removal off site by trucks with tube trailers. Water will be abstracted from the adjacent Oweninny River, ground water or a combination of both. The oxygen produced from electrolysis will be vented to atmosphere.

⁴³ <https://www.glenorawindfarm.com>

An EIAR for this development have been produced, which included an assessment of potential significant effects from the proposed development on nearby protected sites and terrestrial and aquatic ecology within the receiving environment.

These reports concluded that the implementation of appropriate mitigation measures will minimise significant ecological impacts and there is no potential for residual impacts. There is therefore no potential for cumulative negative effects on biodiversity with the proposed development under appraisal in this report.

Open Cycle Gas Turbine (OCGT) Power Plant

The development of a gas power plant (Mayo Co. Co. Planning Reference: 2360028) is proposed at a site approximately 1km from the proposed development site boundary. An EIAR for this development have been produced, which included an assessment of potential significant effects from the proposed development on nearby protected sites and terrestrial and aquatic ecology within the receiving environment.

These reports concluded that the implementation of appropriate mitigation measures will minimise significant ecological impacts and there is no potential for residual impacts. There is therefore no potential for cumulative negative effects on biodiversity with the proposed development under appraisal in this report.

Other Smaller Developments

A review of the Mayo County Council planning portals revealed a number of small scale residential and rural developments (e.g., residential one-off housing and agriculturally based developments) proposed in areas between Crossmolina, Bellacorick and Bangor-Erris in proximity to the proposed development site. Considering the small scale and temporary nature of the residential and rural developments, there is no potential for the nearby small development to result in cumulative effects with the proposed development that could result in significant adverse effects on biodiversity. A full list of planning applications within the wider area of the site are provided in Chapter 5 (Policy, Planning & Development Context) of this EIAR.

7.9.2 Cumulative Assessment Conclusion

No significant residual effects on any ecological receptor have been identified from the sections above.

No significant residual pollution, disturbance, displacement, collision or habitat loss effects were reported for any receptors within any of the nearby wind farm/other assessment reviewed. Taking into consideration other plans or projects no residual cumulative effects are anticipated.

7.10 MITIGATION AND MONITORING MEASURES

The measures described in the following sections have been designed to mitigate potential negative and harmful effects as a result of the proposed development on the KER's identified as part of the impact assessment.

Mitigation is prescribed with regard to the 'Mitigation Hierarchy' set out in the EPA guidelines (EPA, 2022) which requires mitigation by avoidance as a first approach. Where this is not achievable, measures to prevent impacts from giving rise to adverse effects will be adopted (e.g. design of bunded storage for chemicals). Where impacts cannot be avoided e.g. generation of noise) mitigation by reduction of impact is prescribed to limit the exposure of the ecological receptor to an acceptable level (often achieved by interrupting the pathway between the source and receptor). When adverse effects cannot be prevented, mitigation to counteract the effects are required i.e. offsetting measures.

7.10.1 Construction Phase

7.10.1.1 General Mitigation Measures

The proposed development has been designed to incorporate current industry best practice with regards to construction and operation of wind farms, which is described in detail in Chapter 3 (Description of the Proposed Development) of this EIAR.

Best practice measures incorporated into the project design aim to avoid significant effects on the surrounding biodiversity. A CEMP has been developed to provide a framework for how significant effects on the environment will be avoided during the construction phase. All mitigation measures outlined within the chapter will be included within the CEMP.

A suitably qualified Ecological Clerk of works (ECoW) will be appointed by the Contractor. The ECoW will be experienced in the management of peatland habitats and will oversee all construction works and monitor any possible sources for impacts for the duration of the construction programme. The ECoW will guarantee the construction phase of the proposed development will be undertaken in strict agreement with the methods prescribed within the CEMP and will have the power to stop the works in case any activities/works are not compliant.

7.10.1.2 Habitat/Flora Mitigation

7.10.1.2.1 Habitat Loss/Degradation

The proposed development footprint has been designed as far as possible, to avoid known sensitive ecological receptors and has been primarily restricted to cutover bog habitats of low ecological value. Where the clearance of vegetation cannot be avoided, vegetation removal will be kept to a minimum. Where applicable and to minimise peat/ vegetation loss, surface vegetation and upper layers of peat (scraw) will be carefully stripped and temporarily stored to one side, following construction activities this scraw can be reinstated in original areas, in the case of borrow pits and temporary compounds or relocated beside infrastructure sites, such as hard stands or roadways.

All proposed works area will be defined at the outset to define the limits of the proposed works area. The demarcation of the works area will ensure no vegetation clearance will occur outside the proposed development site boundary. There will be no access into areas of Annex I habitat. All disturbed ground, with the exception of the turbines, hardstanding and substation locations, will be fully reinstated following completion of the works.

7.10.1.2.2 Protection of Watercourses

The proposed development has been designed to avoid significant effects on watercourses. The turbines have been located an excess of 50m from all watercourses. No in-stream works are proposed as part of the proposed works. The access track, which crosses the Muingamolt stream and access track to Turbine 16, which crosses the Fiddaunfura Stream will be constructed via a clear-span bridge. The proposed clear-span bridges will comprise a reinforced concrete bridge bed placed on foundations, set 2.5m back from the bank, either side of the stream. Installation of such features will take place during dry periods to reduce the risk of sediment entering the watercourse, more details on this can be found in Chapter 11 (Hydrology).

In addition, a number of smaller drainage channels will be crossed as part of the works. The proposed crossing of these drainage ditches will be undertaken by culverting, only during periods of dry weather. Culverts will be designed to be of a size adequate to carry expected peak flows.

All mitigation measures outlined in Chapter 9 (Land, Soils and Geology), Chapter 10 (Hydrogeology) and Chapter 11 (Hydrology) of this EIAR in relation to the protection of surface and groundwater bodies will be implemented during the proposed construction works, these

mitigations have been collated in the CEMP and within Chapter 20 (Schedule of Mitigation Measures).

Pollution control measures

Pollution control measures which will be implemented during the construction phase are summarised hereunder:

- All construction works will be undertaken with due regard to the guidance contained within the CIRIA Document C741 'Environment Good Practice on Site' (CIRIA, 2015) and with regard to IFI guidance Guidelines on the Protection Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (2016) to ensure the protection of watercourses located within the Proposed Development site.
- No instream works will be permitted during the construction works. Where stream crossing occurs on site, a clear-span design bridge will be used.
- Culverting will only be used for existing forestry/field drains and will be carried out in dry weather periods.
- Fuels and chemicals will be stored within bunded areas as appropriate to guard against potential accidental spills or leakages. The bund area will have a volume of at least 110 % of the volume of such materials stored.
- All on-site refuelling will be carried out by a trained competent operative.
- Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations.
- No refuelling will take place within 50m of any watercourse;
- All equipment and machinery will have regular checking for leakages and quality of performance and will carry spill kits.
- Any servicing of vehicles will be confined to designated and suitably protected areas such as construction compounds.
- Additional drip trays and spill kits will be kept available on site, to ensure that any spills from vehicles are contained and removed off site.
- Soil/peat exposure will be minimized by controlling, in so far as is practical, where and when peat is stripped.
- Concrete is required for the construction of the turbine bases and foundations. No batching of wet-cement products will occur on site. Ready-mixed supply of small amounts of wet concrete products and emplacement of pre-cast elements will take place. Pre-cast elements for bridge, culverts and concrete works will be used.
- After concrete is poured at a construction site, the chutes of ready mixed concrete trucks must be washed out to remove the remaining concrete before it hardens. Wash out of the main concrete bottle will not be permitted on site; wash out will be restricted only to chute wash out. Wash down and washout of the concrete transporting vehicles will take place at an appropriate facility offsite.
- The best management practice objectives for concrete chute washout are to collect and retain all the concrete washout water and solids in leak proof containers or impermeable lined wash out pits, so that the wash material does not reach the soil surface and then migrate to surface waters or into the ground water. The collected concrete washout water and solids will be emptied on a regular basis.
- During the construction phase, four temporary site compounds will be required. Temporary on-site toilet facilities (chemical toilets) will be used. These will be sealed with no discharge to the surface water or groundwater environment adjacent to the site.

Sediment and Erosion Control Measures

Sediment control measures which will be implemented during the construction phase are summarised hereunder:

- The stripping of soils will be kept to a minimum and confined to construction areas only.
- Silt fencing will be erected at the location of watercourse crossings along the grid connection route.
- Silt curtains and floating booms will also be used where deemed to be appropriate and this will be assessed separately at each individual location.
- Excavated material will not be stockpiled or side-cast within 50m of any watercourse.
- During the side casting of peat, silt fences, straw bales and/or biodegradable geogrids will be used to control surface water runoff from the storage areas.
- All surface water run-off from the development will pass through settlement lagoons. It is proposed to locate settlement lagoons immediately downstream of the proposed infrastructure including each hardstand and along all site access tracks.
- Settlement lagoons will be located appropriately and will be installed concurrently with the formation of the access track. They will be located as close to the source of sediment as possible and as far as possible from the buffer zones of existing watercourses. The minimum buffer zone width will be 50m.
- The settlement lagoons will be regularly cleaned/maintained to provide effective and successful operation throughout the works. Outfalls and ditches will be cleaned, when required, starting up stream with the outfalls blocked temporarily prior to cleaning.
- Traffic on site will be kept to a minimum. Only the proposed onsite access track will be used for project-related traffic. Where onsite access tracks pass close to watercourses, silt fencing will be used to protect the streams.

7.10.1.2.3 Management of Invasive Plant Species

Rhododendron, listed on the 'Third Schedule' of Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011) was recorded at the proposed development site. Under this legislation it is an offence to disperse species listed on the Third Schedule.

Prior to the commencement of construction, an invasive species survey of the wind farm construction footprint will be carried out. Further details on this can be seen in Appendix 7.4.

The following mitigation measures, are prescribed to control the translocation or spread of invasive species and / or pathogens:

- Prior to arrival all machinery and equipment used during the construction works will be thoroughly cleaned and then dried using a high-pressured steam cleaning, with water >65 °C, in addition to the removal of all vegetation material. Disinfectant, such as a Virkon® Aquatic solution, will be used. The appointed Contractor will establish and clearly delineate a bunded cleaning/washing area.
- No removed material or run-off will be allowed to enter any water bodies (e.g., drainage ditches).

- A strict biosecurity demarcation area will be installed by the ECoW within zones where invasive species exist.
- Evidence that all machinery and equipment has been cleaned will be required to be on file for review by the statutory authorities and the appointed ECoW.

7.10.1.2.4 Management of Dust

A detailed dust management plan is included in Appendix 12.2 of Chapter 12 – Air Quality and Climate.

In summary, the measures which will be implemented will include:

- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic;
- Any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions;
- Vehicles exiting the site shall make use of a wheel wash facility where appropriate, prior to entering onto public roads;
- Vehicles using site access tracks will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site access track, this will be 20 kph, and on hard surfaced access tracks as site management dictates;
- Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary;
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods; and
- During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.

7.10.1.3 Fauna Mitigation

7.10.1.3.1 Otter

Evidence of otter was recorded within the proposed development site. It is likely that otter occasionally uses large watercourses such as the Muing River within the proposed development site for commuting and foraging. No otter holts or resting places were recorded onsite during the surveys.

Due to the presence of otter activity recorded within the proposed development site, a pre-construction otter survey (as part of a general ecological pre-construction walkover survey) will be undertaken to identify the presence of any new holts or activity. Although no holts were identified, new holts may be established in the interim period between the initial surveys and the construction phase. Therefore, a pre-construction survey will be conducted within the proposed development site and will be undertaken no more than 10–12 months in advance of the construction works as per the NRA (2008)⁵ guidelines. In the event that a new holt

(established within the interim period) is identified within the Zol of the proposed works the developer will engage with NPWS in relation to the appropriate steps to be taken.

No construction lighting will be directed towards watercourses or lakes within the site, in order to maintain a dark corridor for commuting and foraging otter.

Water quality will be protected in all the watercourse onsite following the mitigations detailed in sections 7.10.1.2.1 and 7.10.1.2.2.

7.10.1.3.2 Badger

Signs of badger were recorded within the proposed development site including a dead (roadkill) animal and signs of foraging. No setts however were identified within the Zol of the proposed works. Although no setts were identified, new setts may be established in the interim period between the initial surveys and the construction phase. A pre-construction badger survey within 150m of the proposed development works will be carried out prior to the works commencing.

Pre-construction surveys (as part of a general ecological pre-construction walkover survey) will be carried out in accordance with (NRA, 2006). Should any new setts (established within the interim period) be encountered within the Zol of the proposed development, the developer will engage with NPWS in relation to the appropriate steps to be taken.

Any temporary construction lighting used during the construction works will be cowled away from potential foraging sites to prevent disturbance to badger within the area.

To protect individual badgers during the construction phase of the proposed development, all open excavations on site will be covered when not in use and backfilled as soon as possible. Any deep excavations which are left uncovered will contain egress ramps in place to allow mammals to safely exit excavations should they fall in.

7.10.1.3.3 Pine Marten

There will be no requirement to fell any forestry as part of the proposed development, however in the event that felling is needed and after obtaining the appropriate felling licenses, tree cutting will be limited to time periods outside which pine marten may have young in dens (March and April). Where this is not feasible then areas to be felled will be re-surveyed (as part of a general ecological pre-construction walkover survey) in advance by a suitably qualified ecologist to determine whether any occupied pine marten dens are present. No dens were

recorded during the initial surveys, however there is potential that new dens may have established in the interim period from the initial surveys and construction phase. Should a den be found, the developer will engage with NPWS in relation to the appropriate steps to be taken.

7.10.1.3.4 Common Frog

Due to the presence of frogs in proximity to the proposed development site and the presence of suitable habitat to support frog within the works area, a pre-construction frog spawn survey (as part of a general ecological pre-construction walkover survey) will be undertaken within drainage ditch habitats which maybe be disturbed during the common frog’s spawning season (1st February – 31st June inclusive). In the event that frog new spawn is identified within the footprint of the works, the developer will engage with NPWS in relation to the appropriate steps to be taken.

7.10.1.3.5 Common Lizard

Due to the presence of common lizard in proximity to the proposed development site and the presence of suitable habitat to support lizard within the works area, a preconstruction lizard survey (as part of the general ecological pre-construction walkover survey) will be carried out on habitats that are likely to support the species which may be disturbed during construction.

7.10.1.3.6 Bats

Mitigation is best achieved through avoidance especially in relation to bat fauna. It is proposed that the following measures be put in place to avoid or lessen the degree of impacts on local bat populations (see Table 7-16).

Table 7-16: Summary of Bat Mitigation Measures Recommended During the Construction Phase.

<p>High Level Bat Mitigation This applies to T1, T2, T3, T4, T7, T17 and T18</p>	<p>Moderate Level Bat Mitigation This applies to T5, T6, T8, T9, T11, T13 and T14, This also applies to remaining Internal Road Network</p>	<p>Low Level Bat Mitigation This applies to T10, T12, T15 & T16</p>
<p>A minimum buffer zone of >86.2m according to English Nature calculation around the wind turbines (from the tip of the blade) should be cleared of tall vegetation</p>	<p>A minimum buffer zone of >86.2m around the wind turbines (from the tip of the blade) should be cleared of tall vegetation (shrubs, trees, scrub etc.) to reduce</p>	<p>A minimum buffer zone of >86.2m around the wind turbines (from the tip of the blade) should be cleared of tall vegetation (shrubs, trees, scrub etc.) to reduce</p>

<p>High Level Bat Mitigation This applies to T1, T2, T3, T4, T7, T17 and T18</p>	<p>Moderate Level Bat Mitigation This applies to T5, T6, T8, T9, T11, T13 and T14, This also applies to remaining Internal Road Network</p>	<p>Low Level Bat Mitigation This applies to T10, T12, T15 & T16</p>
<p>(shrubs, trees, scrub etc.) to reduce favourability of this zone for foraging and commuting bats. A low level of vegetation should be maintained for the entire operational phase. This could be achieved by landscape plan which is likely to suppress any new vegetation growth. This will be monitored in year 1, 3 and 5 and every 5 years thereafter for the lifetime of the proposed development to ensure that new scrub vegetation does not develop within the zone around the turbines.</p>	<p>favourability of this zone for foraging and commuting bats. A low level of vegetation should be maintained for the entire operational phase. This could be achieved by landscape which is likely to suppress any new vegetation growth. This should be monitored to ensure that any new scrub vegetation does not develop within the zone around the turbines.</p>	<p>favourability of this zone for foraging and commuting bats. A low level of vegetation should be maintained for the entire operational phase. This could be achieved by landscape which is likely to suppress any new vegetation growth. This should be monitored to ensure that any new scrub vegetation does not develop within the zone around the turbines</p>
<p>Complete clearance work during the autumn and spring months. Complete clearance work at least 6 months prior to installation of wind turbines. Studies have shown that bats are attracted to clear felled forestry areas due to increase insect loading. This has been shown to occur for a period of 3-6 months before the insect loading reduces to precleared felled levels</p>	<p>Complete clearance work during the autumn and spring months. Complete clearance work at least 6 months prior to installation of wind turbines. Studies have shown that bats are attracted to clear felled forestry areas due to increase insect loading. This has been shown to occur for a period of 3-6 months before the insect loading reduces to precleared felled levels</p>	<p>Complete clearance work during the autumn and spring months. Complete clearance work at least 6 months prior to installation of wind turbines. Studies have shown that bats are attracted to clear felled forestry areas due to increase insect loading. This has been shown to occur for a period of 3-6 months before the insect loading reduces to precleared felled levels</p>
<p>Investigate the possibility of providing “bat habitat” of 2 hectares/wind turbine. This land should be located at least 1km away from the nearest wind turbine (e.g. replant lands).</p>	<p>Investigate the possibility of providing “bat habitat” of 0.5 hectares/wind turbine (e.g. replant lands).</p>	<p>Investigate the possibility of providing “bat habitat” of 0.25 hectares/wind turbine (e.g. replant lands).</p>
<p>Undertaken a Potential Bat Roost (PBR) survey of trees proposed to be felled and fell according to PBR value.</p>		
<p>Any biodiversity conservation measures proposed within the proposed development area should be assessed using the following question – Are such measures going to increase or</p>		

<p>High Level Bat Mitigation This applies to T1, T2, T3, T4, T7, T17 and T18</p>	<p>Moderate Level Bat Mitigation This applies to T5, T6, T8, T9, T11, T13 and T14, This also applies to remaining Internal Road Network</p>	<p>Low Level Bat Mitigation This applies to T10, T12, T15 & T16</p>
<p>encourage the likelihood of bats commuting and foraging in close proximity of proposed turbine locations and therefore increasing the likely impact of the proposed development on local bat populations?</p>		
<p>Investigate the potential of providing additional bat roosting sites in operation buildings (e.g., potential substation location outside the buffer zones of the individual turbines) required for the operation of the proposed wind farm. Measures can be implemented to provide roosting spaces, and this is required to mitigation for potential PBR trees proposed to be felled.</p>		

Minimum Buffer Zone

To minimize risk to bat populations, a buffer zone will be implemented around any treeline, hedgerow, woodland feature, into which no part of the turbine should intrude. Using the formula quoted below, the minimum distances of wind turbines for bat mitigation are calculated:

$$\text{Formula: Buffer distance} = \sqrt{(50 + bl)^2 - (hh - fh)^2}$$

where bl = blade length (or half the rotor diameter), hh = hub height, fh = feature height (all in meters)

The dimensions of the wind turbine were provided are as follows: Hub height 121m, Blade radius 79m. Feature height is 25m (typical conifer plantation height, the predominant habitat type present within the survey area). Dimensions of Blade length and Hub height were provided and the calculation is as follows:

$$\text{Buffer distance} = \sqrt{(50 + 79)^2 - (121 - 25)^2}$$

Buffer distance is calculated as **86.2m**

Natterers Bat Roost

A natterers maternity roost was recorded in the toilet block adjacent to Turbine 4, as this roost is located directly adjacent to borrow pit A, the construction of an alternative roost is required. This alternative roost will be in the form of a bat house and will be located adjacent to the conifer plantation at 466458 E and 821818 N. it is deemed important to provide alternative bat roosting to reduce risk to the local Natterer's bat population especially in consideration that the

colony using the toilet block is a confirmed maternity roost and deemed of county importance. A full description of the bat house specification requirements is outlined in Appendix 7.2 Oweninny Bat Survey Results Report.

Additionally, an exclusion zone of 50m is required around the structure to ensure that construction and operational works do not impact on the colony of bats roosting in it. Annual monitoring of the structure should be undertaken until the alternative bat house has sufficiently replaced this structure as a roost.

7.10.1.3.7 Aquatic Fauna (Crayfish, Lamprey and Salmon)

The rivers and watercourses within and immediately adjacent to the proposed development site were found to provide important spawning and nursery habitat for crayfish, lamprey and salmon. The release of construction pollution and/or sediment into the watercourses has the potential to degrade water quality indirectly impacting these aquatic species and their habitats. As such mitigation to control pollution/sedimentation (as discussed in section 7.10.1.2.1) and mitigation to protect watercourses (as discussed in section 7.10.1.2.2) will be followed.

7.10.2 Operational Phase Mitigations

During the operational phase of the development the following mitigation measures will be implemented to avoid identified effects on KERs.

7.10.2.1 Pollution Control during site maintenance

The operational team will carry out maintenance works such as servicing of wind turbine and transmission infrastructure, upkeep of access tracks and any hardstand areas, ensuring drainage system remains functional throughout the operation of the windfarm.

Mitigation for the operational maintenance works include regular scheduled maintenance works, regular inspections of all project elements with any unscheduled repairs or maintenance arising to be undertaken.

The potential impact of hydrocarbon or oil spills during the operational phase of the windfarm are limited by the size of the fuel tank of vehicles used on the site. Mitigation measures for the potential release of hydrocarbons or oil spills include:

- The plant and vehicles to attend site should be regularly inspected or at least prior to the scheduled site visit to be free from leaks and is fit for purpose;
- Fuels stored on site will be minimised, any storage areas will be bunded appropriately for the fuel storage volume for the time period of the operation;

- Operational team to be competent and trained in an emergency plan for the operation phase to deal with accidental spillages; and
- Spill kits will be available to deal with accidental spillages.

7.10.2.2 Bats

Operational mitigation measures proposed for bats will be implemented as per the SNH (2019) guidelines²⁰. A summary of all proposed mitigation measures can be seen in Table 7-17. During bat surveys conducted in 2020, turbines with high levels of bat usage, particularly for Leisler's bat, common pipistrelle, soprano pipistrelle and Natusius' pipistrelle were recorded at turbines T9 and T18.

Bat mitigation measures during the Operational Phase can be determined by implementing a strict surveillance programme for the first three years of operation of the wind farm in order to identify if there exists a substantial risk at a particular turbine location or during a particular time-period (3 yrs - as per recommendation of SNH, 2019²⁰ guidelines). This surveillance should then be repeated at Year 10 and Year 20 of the operation of the wind farm to ensure that sufficient mitigation is being implemented. This surveillance required is as follows:

- a) Bat activity surveillance
The level of bat activity should be monitoring for a minimum of 5 nights at each turbine location (ground level and at height) during three of the eight-month activity period (March/April to October/November). The surveillance periods should be divided into three survey periods to represent the three main periods where bat collisions have been documented: Spring (April/May); Summer (June/July) and Autumn (August/September). Use of the ground-level data alone would underestimate the relative abundance of bat species such as Leisler's bats because bat passes from this species are made only at heights beyond the acoustic range of the ground-based detector. Given that Leisler's bats are at risk of collision with wind turbines, acoustic monitoring at height as well as at ground level is essential.
- b) Carcass search
During the surveillance periods (spring, summer and autumn) of specific wind turbines, carcass search is required for a minimum of 1 morning per turbine (i.e. 9 mornings in total over the 3 year surveillance period). For each turbine, the search area should be 100m radius after ideal bat foraging weather conditions (mild, calm and dry weather and greater than 10°C). A scavenger trial is required to facilitate analysis (as per SNH, 2019 guidelines).

7.10.2.2.1 Feathering of blades

The operation of the turbines will be in a manner that will restrict the rotation of turbine blades as much as possible below the manufacturer's cut-in speed (e.g., by feathering the blades during low wind levels - changes in blade feathering by altering the angle of the blade and therefore preventing the blades from rotating during low wind situations). This will prevent freewheeling or idling of the blades.

A study completed by Exeter University on behalf of Bat Conservation Trust, UK has shown that this single measure relating to the operation of the wind turbines will have a positive outcome for bats, as the amount of time the blades are turning at low wind speeds will be reduced during potential higher bat activity levels (i.e., bats tend to be more active during low wind conditions). The measure was also reported by other studies to be effective when combined with an increase of wind turbine cut-in speed (the velocity at which turbines start producing electricity) and). These two measures have been proven to reduce bat fatalities from 30% to 90% (Arnett et al., 2008⁴⁴, 2010⁴⁵; Baerwald et al., 2009⁴⁶).

Therefore, the blades of turbines will be prevented from freewheeling (idling/spinning). Feathering of the blades during low wind conditions, between dusk and dawn only, during the months when bats are most active (April – October inclusive) will be required for all turbines. Bat mitigation measures during the operational phase will be determined by implementing a strict monitoring programme for the first three years of operation of the proposed development in order to identify if a substantial risk to bats exists at any particular turbine location or during any particular time-period. If monitoring results indicate medium to high bat activity levels and/or bat carcasses are collected, then the following bat mitigation measures may be required at specific turbine locations.

7.10.2.2 Collision Mitigation -Buffer Zones/ Vegetation Maintenance & Removal

Scrub and other tall vegetation growth are likely to occur in vicinity of the wind turbines during the operation of the wind farm. The presence of such habitats in vicinity of the wind turbines may encourage bats to commute and foraging within the wind-swept area of individual turbines. Areas of such habitats around wind turbines may entice bats to forage in these locations, which can lead to fatalities (Horn et al. 2008⁴⁷). Therefore, the immediate habitat surrounding individual turbines will be managed and maintained in such a manner that they do not attract insects (i.e. the concentration of insects in the wind turbine vicinity should be reduced as much as possible, but not such that insect abundancies affected elsewhere on the site). Therefore, it is important to ensure that limited scrub development is permitted within the buffer zones for the

⁴⁴ Arnett, E. B., Brown, W. K., Erickson, W. P., Fiedler, J. K., Hamilton, B. L., Henry, T. H., Jain, A., Johnson, G. D., Kerns, J., Koford, R. R., Nicholson, C. P., O'Connell, T. J., Piorkowski, M. D., & Tankersley, R. D. (2008). Patterns of Bat Fatalities at Wind Energy Facilities in North America. *The Journal of Wildlife Management*, 72(1), 61–78

⁴⁵ Arnett, E. B., Huso, M. M. P., Schirmacher, M. R., & Hayes, J. P. (2010). Altering turbine speed reduces bat mortality at wind-energy facilities. *Frontiers in Ecology and the Environment*, 9(4), 209–214.

⁴⁶ Baerwald, E. F., Edworthy, J., Holder, M., & Barclay, R. M. R. (2009). A Large-Scale Mitigation Experiment to Reduce Bat Fatalities at Wind Energy Facilities. *The Journal of Wildlife Management*, 73(7), 1077–1081.

⁴⁷ Horn, J. W., Arnett, E. B., & Kunz, T. H. (2008). Behavioral responses of bats to operating wind turbines. *Journal of Wildlife Management*, 72(1), 123–132.

turbines and these buffer zones are dependent on the bat activity and bat species recorded within specified buffer zones of the current turbine locations.

7.10.2.2.3 Cut-in Speeds/Curtailment

There are certain bat mitigation measures available in relation to wind farms to reduce fatalities. One successful measure applied to wind farms in Europe is to increase the cut-in speeds of the individual turbines. Raising the cut-in speed above that set by the manufacture can reduce the impact of the wind turbine on bats. Arnett *et al.* (2010)⁴⁵ showed that a 50% decrease in bat fatality can be achieved by increasing the cut-in speed by 1.5 m/s with similar results achieved at European sites. This will be important in order to protect High Risk species (Leisler's bat, soprano and common pipistrelle) foraging/commuting in vicinity of turbine locations.

Reducing fatalities can be done by changing the speed trigger or cut-in speeds of the turbines (i.e. meaning that the turbine is not operational during low wind speeds) or by changing the turbine blades angles which will mean that higher wind speeds are needed to start the wind turbine blades moving. Modern remotely operated wind turbines allow such cut-in speeds to be controlled centrally and automatically.

Increasing the cut-in speed to 5.5 m/s from 30 minutes prior to sunset and to 30 minutes after sunrise to reduce bat collisions with turbines should be employed where required (i.e. at turbine locations where surveillance recorded high bat activity levels for High Risk and Medium Risk bat species and/or bat carcasses were recorded). The duration required depends on the level of bat mitigation required for individual turbine sites (i.e. full bat activity season or confined to spring & autumn months – this will be determine by first year surveillance). A risk assessment should be undertaken using the surveillance data and analysed using best practice e.g. assessment of static data should be completed using the online tool Ecobat (<http://www.mammal.org.uk/science-research/ecostat/>) as recommended by SNH, 2019²⁰ or other equivalent tool depending on most up to-date recommendations at the time of monitoring. Due to the high levels of bat activity, cut-in speeds maybe required at T9 and T18. To determine if this is required, intensive surveillance is required. It is recommended that surveillance is undertaken at the High Risk turbines over a period of three years (first three years of operation, but an annual review is required to determine in the cut-in speeds should be implement after 1 year of operation). If the *Pipistrellus* spp. activity remains high at the High Risk turbines after the first year of surveillance then the cut-in speeds (coupled with carcass search results) should be put in place immediately. High Risk turbines surveillance will continue to review the situation at each individual turbine location for the remaining two years.

7.10.2.2.4 Lighting

Permanent lighting will be installed at the proposed substation site. To avoid lighting impacts to bats, directional lighting will be used to prevent overspill on to woodland edges or treelines/hedgerows which may be used by foraging/commuting bats. This will be achieved through the use of lighting accessories, such as hoods, cowls, louvers and shields, to direct the light to the intended area only which is in line with the Bat Conservation Ireland guidelines; ‘*Bats and Lighting Guidance Notes: Planners, Engineers, Architects and Developers*’.

Table 7-17: Summary of Bat Mitigations Measures Recommended during the Operation Phase

<p>High Level Bat Mitigation – Leisler’s bats This applies to T1, T2, T3, T4, T7</p>	<p>Moderate Level Bat Mitigation This applies to T6, T8, T9, T11, T13, T14, T17 and T18 This also applies to remaining Internal Road Network</p>	<p>Low Level Bat Mitigation This applies to T5, T10, T12, T15 & T16</p>
<p>Operate the wind turbines in a manner that reduces the movement of the blades below the cut-in speed (e.g. by feathering the blades).</p>	<p>Operate the wind turbines in a manner that reduces the movement of the blades below the cut-in speed (e.g. by feathering the blades).</p>	<p>Operate the wind turbines in a manner that reduces the movement of the blades below the cut-in speed (e.g. by feathering the blades).</p>
<p>Monitoring the first three years of operation to determine bat activity levels post construction. Review the results of monitoring at individual High Risk turbines after Year 1.</p>	<p>Put in a monitoring programme for the first year of operation to ensure that bat activity is at a low level in vicinity of these turbines.</p>	<p>Put in a monitoring programme for the first year of operation to ensure that bat activity is at a low level in vicinity of these turbines.</p>
<p>Determine if curtailment is required. Operate the wind turbine from 30 minutes prior sunset to 30 minutes after sunrise at a cut-in speed of 5.5 m/s during specified weather conditions and during the active bat season (April to October). Operate wind farm with specific cut-in speeds from Day 1 of Year 2, if required, and review after surveillance/monitoring is completed.</p>	<p>Review monitoring results to determine if further bat mitigation measures are required.</p>	<p>Review monitoring results to determine if further bat mitigation measures are required</p>
<p>Undertake a carcass search for 3 years post operation of</p>	<p>Undertake a carcass search for 3 years post operation of</p>	<p>Undertake a carcass search for 3 years post operation of</p>

High Level Bat Mitigation – Leisler’s bats This applies to T1, T2, T3, T4, T7	Moderate Level Bat Mitigation This applies to T6, T8, T9, T11, T13, T14, T17 and T18 This also applies to remaining Internal Road Network	Low Level Bat Mitigation This applies to T5, T10, T12, T15 & T16
the wind farm to determine whether a higher cut-in speed of the blades is required. Review after Year 1 along with bat activity monitoring	the wind farm to determine whether a higher cut-in speed of the blades is required.	the wind farm to determine whether a higher cut-in speed of the blades is required.
Maintain immediate area around the wind turbines in a manner that does not attract insects.	Maintain immediate area around the wind turbines in a manner that does not attract insects.	Maintain immediate area around the wind turbines in a manner that does not attract insects.

7.10.3 Decommissioning Phase Mitigation

The expected life span of the proposed development is at least 30 years. The decommissioning works will comprise the removal of all over ground elements of the wind farm.

The mitigation measures that will be considered in relation to any decommissioning works of the site are the same as the those proposed for the construction phase of the development, i.e. as per Section 7.10.1

7.11 ENHANCEMENT MEASURES

A Biodiversity Enhancement Plan has been prepared and is included in Appendix 7.4. Enhancement measures outlined in the plan include the following:

- Rehabilitation measures of remnant blanket bog occurring within the site boundary by improving the hydrological regime via drain blocking.
- Targeted fertiliser (rock phosphate) treatment and improving hydrological conditions (through drain blocking) in areas of bare peat with the aim to promote the expedition of revegetation on the former cutaway blanket bog.
- Removal of self-seeding lodge pole pine trees on recovering cutover bog habitat. The removal of these trees will allow the cutover bog habitats to maintain the appropriate hydrological conditions and plant species needed contribute more to peat forming activities.
- The reinstatement of the borrow pits located within the site. Retaining these pits as mosaic of, revegetated cutover peat, exposed gravel areas and some permanent standing water, which would provide habitat to breeding bird species such as ringed plover.
- The reinstatement of Peat Deposition Area (PDA) within the site. Where excess peat is to be excavated it will be brought to the nearest PDA and profiled to form a thin layer of peat. To increase revegetation of these areas, targeted fertilisation (rock phosphate) and topography profiling to create small areas of standing water will be implemented to

- create the appropriate conditions for peat formation and to provide breeding opportunities for ground nesting birds.
- The control and eradication of the invasive plant species *Rhododendron* within the site will avoid any spread of this species.

The above proposed enhancement measures will positively affect the local biota and increase biodiversity within the receiving environment.

7.12 RESIDUAL EFFECTS

With the proposed avoidance measures, and careful surface water protection procedures in place (as outlined above in section 7.10), the existing biodiversity can be protected during the construction, operation and decommissioning phase. Mitigation measures are based on best available scientific evidence; therefore, confidence can be placed in their likely success. Thus, there will be no significant residual effects arising from the construction phase of the proposed development, the details of which can be seen below.

7.12.1 Effects on Habitats

7.12.1.1 Construction Phase

7.12.1.1.1 Habitat Loss (Direct Effects)

Following the implementation of the mitigation measures proposed in Section 7.10.1.2, there will be **No Significant** residual effects on the habitats at a local scale, that will be temporarily lost, during the proposed construction phase. There will be an initial short term, slight negative effect immediately at the commencement of construction activities, in the form of habitat loss, but as this habitat will be reinstated, resown and/or will naturally regenerate, there is potential for the proposed development to result in an overall long term positive effect within the site.

Following the implementation of the mitigation and enhancement measures proposed in Section 7.10.1.2, there will be **No Significant** residual effects on the habitats at a local scale, that will be permanently lost (i.e. habitat located at the proposed hardstanding areas and along access tracks) during the construction phase. There will be an initial short term, slight negative effect immediately at the commencement of construction activities, in the form of permanent habitat loss, but as the majority of these comprised largely of local importance (lower value) habitats and that where higher value habitat will be lost, a like for like habitat will be planted and/or resown elsewhere on existing lower value habitats within the site, there is potential for the proposed development to result in an overall long term positive effect within the site.

7.12.1.1.2 Habitat Degradation (Indirect Effects)

The release of construction pollution and/or sediment into watercourses has the potential to negatively degrade the watercourse habitats. However, following the implementation of the mitigation measures proposed to control pollution and sedimentation (see section 7.10.1.2.1) and measures to protect watercourses (see section 7.10.1.2.2), any construction pollution and/or sediment which may enter into the Muing and Oweninny River and/or other watercourse located within the site during the construction phase, will result in **Temporary, Slight Significant Negative Effects** on these water features.

The spread of invasive species onsite (Rhododendron) has the potential to outcompete other floral species reducing the diversity of habitats. The transport of material, disturbance of ground (providing areas for invasive species germination) and the movement of machinery or personnel all have the risk of spreading invasive species. With the implementation of the mitigation proposed in section 7.10.1.2.3, **No Significant** residual effects are anticipated on KER habitats within the site boundary, notably the bog habitats.

There is potential that surrounding habitats of local to international importance may be impacted by the generation of dust. The deposition of dust on flora or habitats can inhibit effective photosynthesis and transpiration. Dust management mitigation measures set out in section 7.10.1.2.4 will result in **No Significant Negative Effects** on the receiving biodiversity at a local geographic scale.

7.12.1.2 Operational Phase

There will be no loss of habitats associated with the proposed development during the operational phase. **No Significant Negative Effects** on habitats are anticipated during the operational phase.

7.12.1.3 Decommissioning Phase

No additional loss of habitats are proposed as part of the decommissioning phase. There is likely to be some reinstatement of habitats which were lost during the decommissioning phase. **No Significant Negative Effects** on habitats are anticipated during the decommissioning phase.

7.12.2 Effects on Fauna

7.12.2.1 Otter: Disturbance/displacement

7.12.2.1.1 Construction Phase

Following the implementation of the proposed mitigation measures outlined in section 7.10.1.3.1, the disturbance/displacement and habitat associated with the proposed construction phase is assessed as having **No Significant Negative Effect** on the local otter population.

7.12.2.1.2 Operational Phase

During the operational phase the level of operational traffic and ongoing maintenance is expected to be low. It is considered that any disturbance during the operational phase would result in **No Significant Negative Effects** on the local otter population.

7.12.2.1.3 Decommissioning Phase

Decommissioning phase effects will be similar to the construction phase but the potential for impacts considerably less. Following the implementation of the proposed mitigation measures outlined in section 7.10.1.3.1, the disturbance/displacement associated with the proposed construction phase is assessed as having **No Significant Negative Effect** on the local otter population.

7.12.2.2 Otter: Habitat Degradation

7.12.2.2.1 Construction Phase

Construction works at the proposed development site has the potential to result in indirect effects on aquatic habitat which supports otter and the availability of prey items. These effects are likely to be short-term in duration and include deterioration of water quality due to sediment release during the excavation of turbine foundations, hardstanding areas, borrow pits, substation, internal access tracks, grid connection cabling or potential contamination of water from concrete and/or fuels during construction. It is proposed that measures to control pollution and sedimentation (see section 7.10.1.2.1) and measures to protect water courses (see section 7.10.1.2.2) are to be implemented.

Following the implementation of proposed mitigation measures to protect aquatic environment within the site, habitat degradation of otter associated with the proposed construction phase of the development is assessed as having **No Significant Negative Effect** at a local geographic scale.

7.12.2.2 Operational Phase

It is proposed that measures to control pollution and sedimentation (see section 7.10.1.2.1) and measures to protect water courses (see section 7.10.1.2.2) are to be implemented.

Following the implementation of proposed mitigation measures to protect aquatic environment within the site, habitat degradation of otter associated with the proposed construction phase of the development is assessed as having **No Significant Negative Effect** at a local geographic scale.

7.12.2.3 Decommissioning Phase

Decommissioning phase effects will be similar to the construction phase but the potential for impacts considerably less. Decommissioning of the proposed development would result in the cessation of renewable energy generation, the removal of turbines, and the potential (though unlikely) removal of other infrastructural elements and any effects would be short-term in duration.

Following the implementation of proposed mitigation measures in section 7.10.1.2.1 and 7.10.1.2.2 to protect aquatic environments within the site, habitat degradation of otter associated with the proposed decommissioning phase of the development is assessed as having **No Significant Negative Effect** at a local geographic scale.

7.12.2.3 Badger: Disturbance/displacement and Habitat Loss

7.12.2.3.1 Construction Phase

Following the implementation of the proposed mitigation measures outlined in section 7.10.1.3.2, the disturbance/displacement and habitat loss associated with the proposed construction phase is assessed as having **No Significant Negative Effect** on the local badger population.

7.12.2.3.2 Operational Phase

It is considered that any disturbance during the operational phase would have **No Significant Negative Effect** on the local badger population.

7.12.2.3.3 Decommissioning Phase

Decommissioning phase effects will be similar to the construction phase but the potential for impacts considerably less. Decommissioning of the proposed development would result in the cessation of renewable energy generation, the removal of turbines, and the potential (though unlikely) removal of other infrastructural elements and any effects would be short-term in duration.

Following the implementation of the proposed mitigation measures outlined in section 7.10.1.3.2, the disturbance/displacement and habitat loss associated with the proposed construction phase is assessed as having **No Significant Negative Effect** on the local otter population.

7.12.2.4 Pine Marten: Disturbance/displacement and Habitat Loss

7.12.2.4.1 Construction Phase

Following the implementation of the proposed mitigation measures outlined in section 7.10.1.3.3, the disturbance/displacement and habitat loss associated with the proposed construction phase is assessed as having **No Significant Negative Effect** on the local pine marten population.

7.12.2.4.2 Operational Phase

It is considered that any disturbance during the operational phase would result in **No Significant Negative Effects** on the local pine marten population.

7.12.2.4.3 Decommissioning Phase

Decommissioning phase effects will be similar to the construction phase but the potential for impacts considerably less. Decommissioning of the proposed development would result in the cessation of renewable energy generation, the removal of turbines, and the potential (though unlikely) removal of other infrastructural elements and any effects would be short-term in duration. No additional removal of forestry would be necessary as part of the decommissioning phase. **No Significant Negative Effects** are anticipated on the local pine marten population during the decommissioning phase.

7.12.2.5 Bats: Direct and Indirect Effects

7.12.2.5.1 Construction Phase

7.12.2.5.1.1 Habitat Loss/Roost Loss

Six active bat roosts sites were identified within the proposed development site. One was located to the north of the site in an old disused toilet block, and the remaining roosts are located to the south of the proposed development site, in an old farm shed, the new interpretive centre and the existing Bord na Móna Oweninny Works. None of the above mentioned buildings will be demolished as part of construction works. The proposed works will not result in the loss of any bat roosts.

Only small areas of suitable foraging habitat is due to be removed as part of construction works, but no forestry will be removed.

Therefore, loss of suitable foraging and commuting habitat will be negligible. **Temporary, Slight, Negative Effect** are anticipated during the construction phase.

7.12.2.5.1.2 Disturbance from Temporary Construction Lighting

It is likely that temporary construction lighting will be used within the construction works associated with the proposed development. Lighting can impact bats' roosting sites, commuting routes and foraging areas (Bat Conservation Ireland, 2010⁴⁸). The projection of light on roosts or foraging sites can result in the change of feeding/commuting behaviour of bats in the area. Impacts from temporary lighting on bats would result in a **Temporary, Slight, Negative Effect** on the local population of bats on site during the construction phase.

7.12.2.5.2 Operational Phase

7.12.2.5.2.1 Habitat Loss/Roost Loss

There will be no habitat loss associated with the operation of the wind farm. **No Negative Effects** are anticipated during the operational phase.

⁴⁸ Bat Conservation Ireland (2010) Bats & Lighting, Guidance Notes for: Planners, engineers, architects and developers.

7.12.2.5.2.2 Collisions

Collision risk is a potential issue in relation to bats, with certain species being at greater risk due to their flight characteristics and foraging habitats.

Bat activity around the turbine locations was predominantly low with medium to high levels of activity recorded at some turbines, specifically for Leisler's bat, common pipistrelle, soprano pipistrelle and Natusius' pipistrelle around T9 and T18. More details on the bat species recorded within the site can be seen in **Error! Reference source not found.s** Report.

The potential for death by collision or disturbance on the local bat population as a result of the operation of turbines would be considered to have a negative impact on the local bat populations within the site, during the operational phase. However, following the implementation of the monitoring and mitigation described in section 7.10.1.3.6, effects on the local bat populations within the site are assessed as **Long Term, Slight Negative Effect**.

7.12.2.5.2.3 Lighting Disturbance

Permanent external lighting will be installed at the substation building. Bats species were recorded commuting in these areas following field surveys as detailed in section 7.7.2.2.1 and Appendix 7.2. The external lighting will be automatic with motion detection to provide lighting when site personnel are onsite. Lighting will therefore only be activated when the site is manned.

Impacts from proposed substation lighting on bats would result in a **Brief, Slight Negative Effect** on the local population of bats on site during the operational phase.

7.12.2.5.3 Decommissioning Phase

Decommissioning phase effects will be similar to the construction phase but the potential for impacts is considerably less. Decommissioning of the proposed development would result in the cessation of renewable energy generation, the removal of turbines, and the potential (though unlikely) removal of other infrastructural elements and any effects would be short-term in duration. No removal of vegetation is required as part of the decommissioning phase.

No Significant Negative Effects are anticipated during the decommissioning phase.

7.12.2.6 Watercourses (Aquatic fauna): Habitat Degradation

7.12.2.6.1 Construction Phase

Measures to control pollution and sedimentation and measures to protect water courses will be implemented, as described in Section 7.10.1.2.1 and Section 7.10.1.2.2.

Following the implementation of the mitigation measures proposed, any indirect effects, as a result of habitat degradation on aquatic fauna, within watercourses located within the Zol of the proposed development, during the construction phase will result in **No Significant Negative Effects** on these populations both upstream and downstream of the impacted watercourse.

7.12.2.6.2 Operational Phase

During the operational phase there will be no direct discharges from the proposed development to the surface water environment. There may be occasional maintenance/site visits to the windfarm site during its operation.

Following the implementation of mitigation measure as outlined in section 7.10.2.1, **No Significant Negative Effects** on the aquatic fauna populations both upstream and downstream of the impacted watercourse are anticipated.

7.12.2.6.3 Decommissioning Phase

Decommissioning phase effects will be similar to the construction phase but the potential for impacts considerably less. Decommissioning of the proposed development would result in the cessation of renewable energy generation, the removal of turbines, and the potential (though unlikely) removal of other infrastructural elements and any effects would be short-term in duration.

Habitat degradation of watercourses associated with the proposed decommissioning phase is assessed as having **No Significant Negative Effects**.

7.12.2.7 Common frog: Disturbance/displacement and Habitat Loss

7.12.2.7.1 Construction Phase

A number of drainage ditches will be crossed as part of the proposed development, but this will constitute a small area relative to the overall length of drainage ditches available at the site. A pre-construction frog spawn survey (as part of a general ecological pre-construction walkover

survey) will be undertaken within drainage ditch habitats which may be disturbed during the common frog's spawning season (1st February – 31st June inclusive), more detail on this mitigation measures can be seen in section 7.10.1.3.4.

There will be no significant loss of common frog habitat as a result of the proposed development and abundant suitable supporting habitat for the species occurs throughout the surrounding area. **No Significant Negative Effects** are anticipated on the local population of common frog within the site, as a result of the proposed construction phase.

7.12.2.7.2 Operational Phase

The operational phase will not result in any loss of frog habitat. **No Significant Negative effects** are anticipated during the operational phase.

7.12.2.7.3 Decommissioning Phase

Decommissioning phase effects will be similar to the construction phase but the potential for impacts considerably less. Decommissioning of the proposed development would result in the cessation of renewable energy generation, the removal of turbines, and the potential (though unlikely) removal of other infrastructural elements and any effects would be short-term in duration. **No Significant Negative Effects are anticipated** on the local population of common frog within the site, as a result of the proposed decommissioning phase.

7.12.3 Summary of Residual Effects

The residual effects on ecological receptors are summarised in Table 7-18. All negative effects are predicted to be not significant with the implementation of the above mitigation measures. Due to the habitat creation / enhancement and bat buffer management areas, the residual effects on many terrestrial habitat and species groups will in fact be significant positive at the local scale.

Table 7-18: Summary of Potential Effects on KERs, Mitigation Measures Proposed and Residual Effects After Mitigations Measure Have Been Applied

Group	Ecological Feature	Potential Effect	Scale	Mitigation	Residual Effect
Designated Areas	SACs	Significant Negative Effect	International Scale (EU habitats)	See NIS and sections in 7.10	No significant Effect
	NHAs	No Significant Effect	County/National Scale	None Required	No Significant Effect
	pNHAs	No Significant Effect	County/National Scale	None Required	No Significant Effect
	National Parks	No Significant Effect	County/National Scale	None Required	No Significant Effect
	RAMSAR Site	No Significant Effect	County/National Scale	None Required	No Significant Effect
Habitats	Direct habitat loss - Temporary	Long Term, Slight Negative Effect	Local Geographic Scale	See sections 7.10.1.1 and 7.10.1.2.1	No Significant Effect (Potential of Positive Effects - Habitat enhancement)
	Direct habitat loss - Permanent	Long Term, Slight Negative Effect	Local Geographic Scale	See sections 7.10.1.1 and 7.10.1.2.1	No Significant Effect (Potential of Positive Effects - Habitat enhancement)
	Habitat degradation - Aquatic degradation	Temporary, Significant Negative Effects	Local Geographic Scale	See sections 7.10.1.1, 7.10.1.2.1 and 7.10.1.2.2	No Significant Effect
	Habitat degradation - Dust	Temporary, Slight Negative Effects	Local Geographic Scale	See section 7.10.1.2.4	No Significant Effect

Group	Ecological Feature	Potential Effect	Scale	Mitigation	Residual Effect
Flora	Invasive Species	Long Term, Significant Negative Effects	Local Geographic Scale	See sections 7.10.1.1 and 7.10.1.2.3	No Significant Effect
Bats	Habitat Loss	Temporary, Slight Negative Effects	Local Population within the site	See sections 7.10.1.1 and 7.10.1.3.6	No Significant Effect
	Roost Loss	No Significant Effect	Local Population within the site	See section 7.10.1.3.6	No Significant Effect (Potential of Positive Effects – Additional Roosts)
	Construction Lighting	Temporary, Slight, Negative Effect	Local Population within the site	See section 7.10.1.3.6	No Significant Effect
	Operational Lighting	Temporary, Slight, Negative Effect	Local Population within the site	See section 7.10.2.2.4	No Significant Effect
	Collison Risk	Long Term Moderate Negative Effect	Local Population within the site	See sections 7.10.2.2.1, 7.10.2.2.2 and 7.10.2.2.3	No Significant Effect
Other Fauna	Otter – Disturbance/Displacement and Habitat Loss	Short Term, Significant Negative Effects	Local Population upstream and downstream of watercourses within the site	See sections 7.10.1.1 and 7.10.1.3.1	No Significant Effect
	Otter – Habitat Degradation	Short Term, Significant Negative Effects	Local Geographic Scale	See sections 7.10.1.1, 7.10.1.2.1 and 7.10.1.2.2	No Significant Effect
	Badger - Disturbance/Displacement and Habitat Loss	Short Term, Slight Negative Effect	Local Population within the site	See sections 7.10.1.1 and 7.10.1.3.2	No Significant Effect

Group	Ecological Feature	Potential Effect	Scale	Mitigation	Residual Effect
	Pine Marten - Disturbance/Displacement and Habitat Loss	Temporary, Slight Negative Effect	Local Population within the site	See sections 7.10.1.1 and 7.10.1.3.3	No Significant Effect
	Red Deer - Disturbance/Displacement and Habitat Loss	No Significant Effect	Local Population within the site	None Required	No Significant Effect
	Irish Hare - Disturbance/Displacement and Habitat Loss	No Significant Effect	Local Population within the site	None Required	No Significant Effect
	Common Frog - Disturbance/Displacement and Habitat Loss	Temporary, Slight, Negative Effect	Local Population within the site	See sections 7.10.1.1 and 7.10.1.3.4	No Significant Effect
	Common Lizard - Disturbance/Displacement and Habitat Loss	No Significant Effect	Local Population within the site	None Required	No Significant Effect
	Aquatic Fauna – Habitat Degradation	Temporary, Significant Negative Effects	Local Populations, upstream and downstream of watercourse within the site	See sections 7.10.1.1 and 7.10.1.3.7	No Significant Effect

7.13 SUMMARY

This chapter presents an evaluation of the potential ecological impacts of the proposed development on biodiversity and details appropriate mitigation where potential impacts are identified. The development and implementation of a CEMP, which will include monitoring of construction by a suitably qualified ECoW, is a key instrument in ensuring the implementation of all mitigation measures during construction. A CEMP will be included in this planning application. The residual effects assessment, post implementation of mitigation measures, concluded that the proposed development, when considered individually, will not result in significant effects on any of the identified KERs. In addition, no significant cumulative/in-combination effects are anticipated.

Overall, it can be concluded, the proposed development will not have significant effects on the identified KERs considered as part of the assessment, at any geographic scale, and the proposed development will be constructed and operated in accordance with the design and mitigation described in this EIAR.