



Islandmore Wind Farm

Environmental Impact Assessment
Report

Chapter 5: Biodiversity

Islandmore Wind Farm Limited

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5.1 INTRODUCTION

5.1.1 OVERVIEW OF THE PROJECT

The Islandmore Wind Farm will be located in the north of County Roscommon, c. 2km north of Ballaghaderreen, c. 13km east of Charlestown (Co. Mayo) and c. 6km southwest of Gorteen (Co. Sligo). See **Chapter 3** for a full description of the project.

5.1.2 SCOPE

APEM Group Woodrow was commissioned undertake an ecological impact assessment of the project. This chapter encompasses all aspects of ecology including ornithology. The scope of this work is described in **Section 5.1.2**, which provides details of the desktop study, ecological surveys conducted, survey effort and the impact assessment methodology applied.

This chapter is supported by the following annexes which provide detailed ecological reports and figures displaying the results of ecological surveying:-

- **Annex 5.1:** Existing Ecological Records;
- **Annex 5.2:** Habitats;
- **Annex 5.3:** Habitat Management Plan;
- **Annex 5.4:** Mammal Surveys;
- **Annex 5.5:** Mammal Report (Confidential);
- **Annex 5.6:** Bat Survey Report;
- **Annex 5.7:** Baseline Ornithological Report;
 - **Annex 5.7A:** Survey Effort and Weather Conditions;
 - **Annex 5.7B:** Viewshed Analysis;
 - **Annex 5.7C:** Vantage Point Survey Results;
 - **Annex 5.7D:** Walkover Survey Results;
 - **Annex 5.7E:** Wider Area Waterbird Survey Results;
- **Annex 5.8:** Confidential Hen Harrier Annex;
- **Annex 5.9:** Collision Risk Modelling Report;
- **Annex 5.10:** Amphibians and Reptiles Report;
- **Annex 5.11:** Invertebrates Report; and,
- **Annex 5.12:** Freshwater Ecology.

5.1.3 STATEMENT OF AUTHORITY

APEM Group Woodrow is an established and accomplished environmental consultancy committed to delivering robust ecological assessment services for clients in the private and public sectors. Woodrow provides an in-house team of ecologists and environmental professionals whose primary specialisms include botany, habitats, birds, bats, mammals, invertebrates and aquatic ecology. Woodrow's investment in high-technology field equipment and software ensures reliability and confidence in our work. Woodrow staff are fully conversant with wildlife legislation in both Ireland and the UK, and work to exacting standards, according to established guidelines

issued by the Chartered Institute of Ecology and Environmental Management (CIEEM). All the ecological surveys were carried out by appropriately experienced surveyors. For ornithological and bat surveys Woodrow staff were assisted by trusted sub-contracted fieldworkers regularly utilised by the company.

Habitat and botanical surveys were conducted by Meadhbh Costigan (MC), and Brendan Burley (BB). Meadhbh compiled the habitat reporting and habitat management sections. Reporting was reviewed by Bridget Keehan (BK).

Aquatic and fisheries assessment surveys were conducted by Darren Craig (DC) and James O'Connor (JOC), with reporting conducted by Darren and reviewed by James.

The list of ornithological surveyors that conducted surveys from October 2019 to March 2025 included: Ken Westman (KW), Patrick Devereux (PD), Jamie Bliss (JB), David Russel (DR), Mike Holt (MH), Geoff Oliver (GO), Aoife Moroney (AM), Dáithí Lavelle (DL), Aron Sapsford (AS), Ajay Cheruthon (AC), Sammy Pooley (SP), James O'Connor (JOC), Bruno Mels (BM), Conn Barry (CB), Leona McSharry (LMS), John Ball (JB2). John Ball (JB2) was responsible for compiling the sections covering ornithology with assistance from Julieta Pedrana (JP). Matthew Rea (MR) and James Spencer (JS) reviewed these sections.

Bat surveys were conducted by Frederico Hintze (FH), Oisín O Sullivan (OOS), Patrick Power (PP), Róisín O'Connell (ROC), Damien McAndrew (DMcA) and Kevin O'Reilly (KOR). Bat Data analysis was carried out by Louise Gannon and Róisín O'Connell. Bat statistical analysis was completed by Bruno Mels. Compilation of the bat report was conducted by Louise Gannon, Kevin O'Reilly, Damien Mc Andrew and Patrick Power. All reporting for bat surveys has been reviewed and approved by Jason Guile (JG).

Non-volant terrestrial mammal surveys were conducted by Darren Craig (DC) and Adrian Walsh (AW). Darren compiled the relevant reporting. Reporting was reviewed by Patrick Quinn (PQ).

An overview of survey effort is provided in Table 1 and surveys can be traced to surveyors by their initials.

5.1.4 KEY WOODROW PERSONNEL

John Ball BSc (Hons) MSc – Senior Ornithologist - responsible for project management including client liaison and delivery of ornithological sections. John is an ornithologist specialising in wetland birds and leading on EIA for renewable energy developments throughout Ireland and the UK.

Brendan Burley BSc (Hons) MSc Peatland Specialist - responsible for leading Phase 1 botanical fieldwork and habitat management plan. Brendan is a peatland specialist with over eighteen years of experience in habitat surveying and land management across a wide variety of terrestrial habitats. Since joining the APEM Group Brendan has focused on peatland restoration work across the UK and Ireland, including Wind Farm developments and other large-scale developments.

Meadhbh Costigan BA (Hons) MSc Senior Ecologist - responsible for project management including client liaison as well as delivery of the habitat and invertebrate sections. Meadhbh works delivering Ecological Impact Assessments and Habitat Management Plans for the renewable energy sector, specifically Wind Farms. She works closely with clients to find solutions to ecological constraints to development. She has experience consulting with multidisciplinary teams on the mitigation hierarchy and best practice guidance regarding the protected habitats and plant species.

Darren Craig BSc Senior Ecologist – Responsible for conducting surveys and reporting on non-volant terrestrial mammal sections and freshwater aquatic sections. Darren Craig is an ecologist with a BSc in Applied Aquatic Ecology from the Atlantic Technological University, Galway. He is proficient in aquatic surveys and has survey experience working with mammals, birds and habitats. He is well experienced in survey design, report writing and project management for a variety of projects. Darren has experience leading on Ecological Impact Assessments for Wind Farms.

Bridget Keehan BSc (Hons) MCIEEM Botany Technical Specialist - responsible for quality assurance of the habitat sections. Bridget Keehan is a professional field botanist, with over 30 years of experience in plant identification. She leads in Botany with Woodrow and has outstanding habitat classification skills and extensive experience. She undertakes specialist protected habitat & species surveys to inform site assessments; is proficient in producing concise habitat maps and presenting survey data. Having worked on over 40 quarry & wind farm sites Bridget has wide experience preparing Compliance Reports, Habitat Management Plans, Ecological Impact Assessments and Natura Impact Statements, including provision of mitigation recommendations. With up-to-date practical knowledge of both European & National (NI & ROI) environmental legislation she is proficient in providing advice and developing strategies.

Damien McAndrew BSc Ecologist – Bat Surveyor and reporting. Damien has extensive experience in managing and carrying out static detector surveys, transect assessments, bat roost inspections, data analysis, and comprehensive bat reporting. Damien has worked in various consultancies across Ireland prior to joining Woodrow. He has been involved in a variety of surveying, including terrestrial mammals, bats, and extensive ornithology monitoring through Winter and Breeding Bird Surveys. Additionally, he has drafted reports including ecological impact assessment and Stage 1 and Stage 2 of appropriate assessments for Wind Farm developments. Damien has carried out unmanned aerial vehicle (UAV) missions in remote and urban environments as part of habitat assessments and information gathering to assess Third Schedule Invasive Non-Native Species (INNS) presence.

Oisín O Sullivan Senior Ecologist Bat surveyor. Oisín O'Sullivan was a Senior Ecologist with Woodrow. Oisín has completed a B.Sc. in Ecology and Environmental Biology at University College Cork. His final year thesis involved bat surveys of urban habitats in Cork City. His work as a graduate ecologist with Woodrow was focused on bat data analysis including bat call identification and bat roost/habitat suitability surveys. Oisín has developed a high level of proficiency with Kaleidoscope, Ecobat and BatExplorer, all of which are analysis software used to assess bat calls and activity Since joining Woodrow, Oisín work involves coordinating, surveying, analysing data, and writing bat technical reports for onshore wind developments. This also involves the use of R (statistical analysis) to provide data on bat activity relative to weather conditions with the goal of informing curtailment strategies as a mitigation measure. During 2022 Woodrow began undertaking offshore bat surveys, Oisín is a technical lead on these projects. Oisín is a Qualifying member of CIEEM and holds a license from the Department of Culture Heritage and the Gaeltacht.

Patrick Power BSc (Hons) PGDip Ecologist Bat Surveyor and co-author of report. Patrick Power is an ecologist with Woodrow. Patrick has completed a BSc in Forestry, BSc (Hons) in land management in Forestry with Waterford Institute of Technology and a PGCert in Wildlife Biology and Conservation with Edinburgh Napier University. His work with Woodrow is focused on bat data analysis including bat call identification and bat roost/habitat suitability surveys. Patrick has developed a high level of proficiency

with Kaleidoscope and BatExplorer, the analysis software used to assess bat calls and activity. Patrick also possess Reptile, mammal, and woodland tree surveying skills. Patrick currently has a bat licence from the Department of Culture Heritage and the Gaeltacht.

Róisín O Connell BSc Ecologist, Bat Surveyor and Data Analysis. Róisín O'Connell is an ecologist with Woodrow. Róisín has completed a B.Sc. in Environmental Science at Atlantic Technological University in Sligo. Her final year thesis involved carrying out aquatic macrophyte surveys of lough Doon in County Leitrim. Her work as a graduate ecologist with Woodrow is focused on bat data analysis including bat call identification and bat roost/habitat suitability surveys. Róisín has developed a high level of proficiency with Kaleidoscope and BatExplorer, the analysis software used to assess bat calls and activity. Róisín also possesses marine and freshwater habitat survey skills from her time studying at ATU. Since joining Woodrow, Róisín has authored multiple bat activity reports and coordinated bat surveys. She has also undertaken numerous bat surveys including static detector deployment and roost surveys and worked on several large-scale developments. Róisín is a Qualifying member of CIEEM and holds a licence to survey bat roosts from the Department of Culture Housing, Local Government and Heritage.

Louise Gannon BSc (Hons) Ecologist Data analysis for this assessment. Louise Gannon is an Ecologist with Woodrow. Louise has completed a B.Sc. in Environmental Science. Her main experience lies in conducting protected species surveys for bats (preliminary roost assessments, emergence/re-entry surveys and activity transect surveys), as well as the deployment of static bat detectors and reporting on the same. She also conducts bat call analysis using Kaleidoscope and BatExplorer, the analysis software used to assess bat calls and activity. Louise also has experience in conducting otter, badger, and red squirrel surveys. Louise is a licenced bat surveyor and a Qualifying member of CIEEM.

Frederico Hintze BSc MSc PhD Ecologist Bat surveyor. Frederico Hintze was an Ecologist working with Woodrow. He holds a B.Sc. in Biology-Geology and an M.Sc. in Ecology from the University of Minho (Portugal), as well as a PhD in Animal Biology from the Federal University of Pernambuco (Brazil). His passion for bat research and monitoring began during his undergraduate thesis in 2009. For his master's thesis, he focused on assessing the impact of agricultural dams on bat populations in Northeastern Portugal. During his PhD, FH utilized bioacoustics and species distribution modelling to enhance our understanding of the distribution of Neotropical bat species. Subsequently, his post-doctoral work led him to the world's largest iron ore mine in Carajás, Pará, Brazil, where he aimed to characterize the vocalizations of Amazonian bats and assess the impacts of mining on bat populations. Throughout his career, has actively participated in numerous Environmental Impact Assessment (EIA) projects in Portugal, covering various developments including dams, wind farms, roads, and transmission lines. He also served as the coordinator of the Bioacoustics Committee at the Brazilian Bat Research Society. In addition to his academic contributions, he has authored over fifteen scientific publications and sampling event datasets, showcasing his expertise in the field. As an ecologist with Woodrow, his work focused on bat data analysis, including bat call identification, bat roost/habitat suitability surveys, and report writing and review. He possesses a high level of proficiency and experience with various analysis software used to assess bat calls and activity.

Bruno Mels BSc MSc – Ecologist and Data Coordinator – Bat surveyor and statistical analysis for this assessment. Bruno Mels (BM) is an Ecologist and Data Coordinator at Woodrow. He is experienced in undertaking habitat suitability modelling, and

statistical analysis and modelling using R and Maxent. Bruno is also competent in modelling species population trends using Stella. He is also a digital illustrator, having designed and created various information boards for UNESCO world heritage sites in the Seychelles. BM has a vast amount of experience mapping with both ArcGIS and QGIS, as well as data management using Excel and Access.

James O'Connor BSc MSc PhD Senior Ecologist – responsible for ensuring quality assurance on the freshwater aquatic sections. James has a PhD in Aquatic Sciences from the Marine and Freshwater Research Centre at ATU, Galway and an MSc in Applied Environmental Science from UCD, Dublin. He is highly proficient in aquatic surveys (predominantly freshwater) and has survey experience working with birds and mammals. He has experience delivering freshwater aquatic, bird sections for Biodiversity Chapters for Environmental Impact Assessments for Wind Farm developments. He is well experienced in report writing and research publication, where he has also demonstrated his project management skills working as part of a broader research team.

Kevin O'Reilly BBL MSc Ecologist – responsible for conducting bat surveys and contributing to report writing. Since joining Woodrow, Kevin has undertaken a broad range of ecological surveys on large-scale renewable energy projects including Wind Farm developments. Kevin has also prepared AA screening reports as well as technical reports and environmental impact assessment reports for Wind Farms. Kevin obtained a Degree in Business and Law at University College Dublin before training and qualifying as a Solicitor with the Law Society of Ireland. He has completed a master's in environmental management and GIS with Ulster University with a research focus on bats and LED street lighting.

Julieta Pedrana PhD BSc Senior Ecologist – responsible for quality assurance of the Collision Risk Model. An experienced ecologist, Julieta Pedrana has worked for over ten years on environmental impact assessments and in the application of GIS-based modelling in nature conservation, including assessing Collision Risk Models for Wind Farm developments. Julieta has been engaged in several conservation projects and specialises in ornithology surveys. Patrick Quinn ACIEEM AEECoW IFM Principal Ornithologist – Patrick Quinn has over 10 years' experience in a wide array of construction projects, including large scale wind farm construction, 110kV overhead transmission lines, roads/bridges and other infrastructure projects, including works within sensitive and designated areas (including Natura 2000 sites). He has a significant level of experience in aquatic ecology and monitoring include water treatment plants and water scheme infrastructure projects that require ecological supervision throughout Ireland.

Matt Rea BSc MSc Head of Terrestrial Ornithology – ornithology review and quality assurance. Matt is an Associate Director and Head of Terrestrial Ornithology with over 10 years' experience as a professional ornithological consultant, leading APEM's Terrestrial and Intertidal Ornithology team. Based in Scotland, he has managed and delivered ornithological surveys, impact assessments and technical reviews for renewable energy developments across Ireland and the UK, including more than 60 onshore wind energy projects. Matt has led ornithological assessments for projects throughout both the Republic of Ireland and Northern Ireland and is highly experienced in Collision Risk Modelling (CRM), Environmental Impact Assessment (EIAR/EIA) and Appropriate Assessment (AA/HRA). He has designed and coordinated numerous large-scale survey programmes for wind farm and wind farm repowering developments, providing technical oversight from baseline data collection through to impact assessment and mitigation design. Matt has substantial experience of the

Irish planning and consenting process, including the assessment of impacts on designated sites and protected bird species, and regularly provides technical leadership and quality assurance for EIAR ornithology chapters.

James Spencer BSc (Hons) Service Line Director for Ornithology – ornithology review and quality assurance. James Spencer BSc (Hons) is Service Line Director for Ornithology at APEM and has over 16 years' professional experience in ornithological assessment and consultancy. He provides technical leadership and review for Environmental Impact Assessment Report (EIAR), Appropriate Assessment (AA) and Natura Impact Statement (NIS) projects across Ireland, particularly in relation to renewable energy developments. In Ireland, James has undertaken ornithological baseline survey work for multiple onshore wind projects and has acted as a senior reviewer of four EIAR ornithology chapters, providing quality assurance, technical direction and assessment review. His experience includes survey design, analysis of ornithological data, impact assessment, mitigation development, collision risk assessment, and consideration of effects on nationally and internationally designated sites. Alongside his Irish experience, James leads a team of over 30 ornithologists delivering complex infrastructure and renewable energy projects throughout the UK and Europe, bringing extensive expertise in the assessment of sensitive bird populations and the preparation of robust, consentable ornithological assessments.

Adrian Walsh BSc MSc Ecologist – responsible for assisting in mammal surveys. Since joining Woodrow, he has been involved in a variety of surveying, including terrestrial mammals, bats and extensive ornithology monitoring. Additionally, he has provided input into several ecological reports including EclA, AA and PCCM reports for Wind Farm developments and has gained valuable project management experience.

Jason Guile BSc HND Associate Director – responsible for quality assurance of the bat ecology sections. Jason is an Associate Director - Ecology with APEM Group Woodrow. Jason has over 15 years' experience in ecological assessment and holds a BSc in Marine Biology/Oceanography from the University of Wales, Bangor and a HND in Coastal Conservation with Marine Biology from Blackpool and Fylde College. Jason has a wide range of experience in the preparation of Environmental Impact Assessment Reports, Appropriate Assessment Screening reports and Natura Impact Statements. Jason was the lead ecologist on a range of projects in the UK, including large scale infrastructural schemes. Since moving to Ireland, he has been lead ecologist / author (EIAR, EclA, AA Screening reports and NIS's) for a number of projects including renewables, historic landfill remediation works, urban planning applications and commercial regeneration sites.

Róisín NigFhloinn B.A. Mod. (Hons) MSc MCIEEM Associate Director – Review of EIAR Biodiversity Chapter & quality assurance. Róisín is an Associate Director - Ecology with Woodrow. She has more than 16 years' practice working as an ecological consultant in the UK and Ireland with experience in environmental and ecological impact assessment and mitigation design for development projects including national road schemes, national trails, overhead power lines, grid connection, other infrastructure projects and smaller scale commercial and residential developments. Róisín is competent in the compilation of Ecological and Environmental reports, including Ecological Impact Assessment (EclA), to inform planning proposals, and as part of Environmental Impact Assessment Reports (EIAR) and reports to inform the Appropriate Assessment process (Screening and Natura Impact Statements (NIS) (Habitats Regulations Assessment in Northern Ireland). Róisín holds a MSc in Ecology and management of the Natural Environment from University of Bristol (2011) and a

B.A. Mod (BSc)(Hons)Natural Sciences from Trinity college, Dublin Specialising in Botany (2008). She is a full member of CIEEM.

5.1.4 LEGISLATION AND POLICY

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

- European Union, 2011. Directive 2011/92/EU of the European Parliament and of the Council on the assessment of the effects of certain public and private projects on the environment (EIA Directive), as amended by Directive 2014/52/EU. Official Journal of the European Union, L124, pp.1–18;
- European Parliament & Council (2000) *Directive 2000/60/EC establishing a framework for Community action in the field of water policy*. Official Journal of the European Communities, L 327, pp. 1–73. Available at: <https://eur-lex.europa.eu/eli/dir/2000/60/oj/eng>. *The Water Framework Directive (WFD)*;
- Council of the European Communities, 1992. Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive), as amended. Official Journal of the European Communities, L206, pp.7–50. Note: *River Moy SAC is designated under this legislation*;
- European Communities (Quality of Salmonid Waters) regulations, S.I. No 84 of 1988;
- European Parliament and Council, 2009. Directive 2009/147/EC on the conservation of wild birds (Birds Directive), as amended. Official Journal of the European Union, L20, pp.7–25;
- Government of Ireland, 2011–2021. *European Communities (Birds and Natural Habitats) Regulations 2011–2021*. Dublin: Office of the Attorney General;
- Government of Ireland, 1976–2002. *Wildlife Act 1976–2002*, as amended. Dublin: Office of the Attorney General;
- Government of Ireland, 2000. *Planning and Development Act 2000*, as amended. Dublin: Office of the Attorney General;
- Government of Ireland, 2024. *Planning and Development Act 2024*, as amended. Dublin: Office of the Attorney General; and,
- Government of Ireland, 2022. *Flora (Protection) Order 2022* (S.I. No. 235 of 2022). Dublin: Government Publications.

It should be noted that any references to legislation include any amendments thereto.

5.1.6 PLANS AND POLICY

The following plans, and their policies relevant to biodiversity, were considered in this chapter and the assessment of effects on terrestrial ecology and biodiversity occurring within the project area:-

- Department of Housing, Local Government and Heritage, 2024. *Ireland's 4th National Biodiversity Action Plan 2023-2030*. Dublin: Department of Housing, Local Government and Heritage;
- Department of Climate, Energy and the Environment, 2025. *Climate Action Plan 2025*. Dublin: Department of Climate, Energy and the Environment;
- Department of Housing, Local Government and Heritage, 2024. *Water Action Plan 2024: A River Basin Management Plan for Ireland*. Dublin: Department of Housing, Local Government and Heritage;

- National Biodiversity Data Centre, 2021. *All-Ireland Pollinator Plan 2021–2025*. Waterford: National Biodiversity Data Centre;
- National Parks and Wildlife Service and Environment & Heritage Service, 2008. *All-Ireland Species Action Plan: Bats*. Dublin: NPWS and Belfast: Environment & Heritage Service; and,
- Roscommon County Council, 2022. *Roscommon County Development Plan 2022–2028*. Roscommon: Roscommon County Council.

5.1.7 GUIDANCE

The guidelines listed below are, in our professional opinion, widely recognized and respected as representing the best available practice for environmental impact assessments. Therefore, in considering ecological survey and assessment of impacts of the project, regard was made to the following guidance and information documents:-

- CIEEM, 2024. *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine*. Version 1.3 Winchester: Chartered Institute of Ecology and Environmental Management;
- Department of Housing, Local Government and Heritage, 2024. *Ireland's 4th National Biodiversity Action Plan 2023-2030*. Dublin: Department of Housing, Local Government and Heritage;
- Department of Housing, Local Government and Heritage, 2024. *Water Action Plan 2024: A River Basin Management Plan for Ireland*. Dublin: Department of Housing, Local Government and Heritage;
- EPA, 2022. *Guidelines on the Information to be Contained in Environmental Impact Assessment Report (May 2022)*. Dublin: Environmental Protection Agency;
- European Commission, 2007. *Guidelines for the Strict Protection of Animal Species of Community Interest Under the Habitats Directive*. Brussels: European Commission;
- European Commission, 2017. *Environmental Impact Assessment of Projects: Guidance on the Preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended)*. Brussels: European Commission;
- Fossitt, J.A., 2000. *A Guide to Habitats in Ireland*. Kilkenny: The Heritage Council;
- Gammell, M., McFarlane, A., Brady, D., O'Brien, J., Mirimin, L., Graham, C., Lally, H., Minto, C. and O'Connor, I., 2021. *White-clawed Crayfish *Austropotamobius pallipes* Survey in Designated SACs in 2017*. Irish Wildlife Manuals, No. 131. Dublin: National Parks and Wildlife Service, Department of Housing, Local Government and Heritage;
- Gilbert, G., Stanbury, A. and Lewis, L., 2021. *Birds of Conservation Concern in Ireland 2020–2026*. *Irish Birds*, 9, pp.523–544;
- Hendry, K. and Cragg-Hine, D., 1997. *Restoration of Riverine Salmonid Habitats – A Guidance Manual*. Fisheries Technical Manual 4. APEM Ltd. Environment Agency National R&D Project W2/i584 - EA R&D Technical Report W44;

- JNCC, 2015. *Common Standards Monitoring Guidance for Freshwater Fauna*. Peterborough: Joint Nature Conservation Committee;
- Environmental Protection Agency (EPA) 2020, *River Monitoring – Aquatic Invertebrates*, EPA Ireland;
- Marnell, F., Kelleher, C. and Mullen, E., 2022. *Bat Mitigation Guidelines for Ireland*. Version 2. Irish Wildlife Manuals, No. 134. Dublin: National Parks and Wildlife Service, Department of Housing, Local Government and Heritage;
- National Biodiversity Data Centre, 2021. *All-Ireland Pollinator Plan 2021–2025*. Waterford: National Biodiversity Data Centre;
- National Parks and Wildlife Service and Environment & Heritage Service, 2008. *All-Ireland Species Action Plan: Bats*. Dublin: NPWS and Belfast: Environment & Heritage Service;
- NatureScot, 2021. *Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation*. Scotland's Nature Agency. Version: August 2021 (updated with minor revisions);
- NatureScot, 2023. *Advising on Peatland, Carbon-Rich Soils and Priority Peatland Habitats in Development Management*. Scotland: NatureScot;
- Northern Ireland Environment Agency, 2021. *Guidance on Bat Surveys, Assessment and Mitigation for Onshore Wind Turbine Developments in Northern Ireland*. Version 1.1. Belfast: Department of Agriculture, Environment and Rural Affairs (Northern Ireland);
- Peay, S., 2003. *Monitoring the White-clawed Crayfish Austropotamobius pallipes*. Conserving Natura 2000 Rivers Monitoring Series No. 1. Peterborough: English Nature;
- Roscommon County Council, 2022. *Roscommon County Development Plan 2022–2028*. Roscommon: Roscommon County Council;
- Scottish Environmental Protection Agency (SEPA), 2017. *SEPA Guidance: Developments on Peat and Off-site Uses of Waste Peat*. Scotland: SEPA;
- Scottish Natural Heritage, 2017. *Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms*. Version 2. Scotland: Scottish Natural Heritage;
- Scottish Renewables and SEPA, 2012. *Developments on Peatland: Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste*. Scotland: Scottish Renewables and SEPA;
- Scottish Renewables, Scottish Natural Heritage, Scottish Environmental Protection Agency, Forestry Commission Scotland, and Historic Environment Scotland, 2015. *Good Practice During Wind Farm Construction*. Scotland: Scottish Renewables;
- Smith, G.F., et al., 2011. *Best Practice Guidance for Habitat Survey and Mapping in Ireland*. Ireland: Heritage Council;
- Transport Infrastructure Ireland (TII), 2006a. *Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes*. Dublin: National Roads Authority;

- Transport Infrastructure Ireland (TII), 2008. Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes. Dublin: National Roads Authority;
- Transport Infrastructure Ireland (TII), 2009a. *Guidelines for the Assessment of Ecological Impacts of National Road Schemes* (Rev 2). Dublin: National Roads Authority;
- Transport Infrastructure Ireland (TII), 2009b. *Ecological Surveying Techniques for Protected Flora and Fauna During the Planning of National Road Schemes* (Rev 2). Dublin: National Roads Authority; and,
- Transport Infrastructure Ireland (TII), 2010. *Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads*. Dublin: National Roads Authority.

5.1.8 INFORMATION SOURCES

The following databases and sources of information have informed the ecological assessment:-

- Environmental Protection Agency (EPA), 2025. *EPA Maps*. [online] Available at: <https://gis.epa.ie/EPAMaps/> [Accessed 30 Sep. 2026];
- National Biodiversity Data Centre (NBDC), 2025. *Biodiversity Maps*. [online] Available at: <https://maps.biodiversityireland.ie/> [Accessed 30 Sep. 2026];
- National Parks and Wildlife Service (NPWS), 2025. *ArcGIS Web Application*. [online] Available at: <https://dahg.maps.arcgis.com/apps/webappviewer/index.html> [Accessed 30 Sep. 2026];
- Environmental Protection Agency (EPA), 2025. *Catchments Database*. [online] Available at: https://www.catchments.ie/data/#/?_k=y07phw [Accessed 30 Sep. 2026];
- Irish Biodiversity, 2024. *Irish Vegetation Classification*. [online] Available at: <https://www.biodiversityireland.ie/ivc> [Accessed 30 Sep. 2026];
- Irish Wetland Bird Survey, 2024. *Map of Sites*. [online] Available at: <https://bwi.maps.arcgis.com/apps/View/index.html?appid=1043ba01fcb74c78bc75e306eda48d3a> [Accessed 30 Sep. 2026];
- Irish Wetland Bird Survey, 2024. *Site Peak Counts*. [online] Available at: <https://c0amf055.caspio.com/dp/f4db30005dbe20614b404564be88> [Accessed 30 Sep. 2026];
- Irish Wetland Bird Survey, 2024. *Species Trends by Sites*. [online] Available at: https://birdwatchireland.ie/app/uploads/2022/04/iwebs_trends_report.html [Accessed 30 Sep. 2026];
- National Biodiversity Data Centre (NBDC), 2025. *Irish Vegetation Classification (IVC)*. [online] Available at: <https://www.biodiversityireland.ie/ivc> [Accessed 30 Sep. 2026];
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5.1.9 POTENTIAL LIMITATIONS

The information contained in this chapter of the EIAR includes robust data which has been used to assess the likely effects of the project on biodiversity. Where relevant, residual impacts are described in detail. No significant limitations were identified in terms of scale, scope or context in the preparation of the chapter.

Where minor survey and data analysis limitations were encountered, they have been accounted for in the relevant annexes.

5.2 METHODOLOGY

5.2.1 DESKTOP SURVEY METHODOLOGY

5.2.1.1 Existing Ecological Records

A search for species records was completed, using the National Biodiversity Data Centre (NBDC) website on 16 December 2024. Species records from the last 10-years were obtained for the 10km grid squares (G60 and M69) where the project site is located.

These records were used to determine which notable or protected habitats and species, as well as terrestrial invasive non-native species, are likely to occur within the project site, as is standard practice for ecological desk studies to inform survey design and identify potential constraints.

Bats

To supplement the NBDC information on bats and bat roosts, additional desk-study information was reviewed, including the habitat suitability mapping presented by Lundy *et al.* (2011). This mapping indicates broad-scale patterns of bat occurrence and habitat suitability and was used as contextual information rather than evidence of site-specific presence or absence (see **Annex 5.6**). Aerial imagery and 6-inch mapping were also examined to identify potential bat foraging, commuting and roosting habitat. Bat Conservation Ireland (BCI) was asked to provide roost and *ad hoc* survey records for the 10 km grid squares G60 and M69, within which the project site is located; the results were received on 2 August 2024. The desk study informed the scope of field surveys undertaken in accordance with the applicable guidance.

Birds

Information collated on avian assemblages from the NBDC was used to identify target species potentially occurring within the project site. An initial desk-based review of the 500m turbine buffer and surrounding area was conducted, considering appropriate distances for potential species ranges and connectivity to designated sites. This review aimed to determine the necessary surveys to assess potential ornithological constraints. A preliminary evaluation of avian habitat suitability and availability was carried out using ortho-imagery and 6-inch mapping, viewed through platforms such

as *Bing Maps*, *Google EarthPro*, *Google Maps*, and *Ordnance Survey Ireland – GeoHive*. This was supplemented by scoping visits to the area.

The National Parks and Wildlife Services (NPWS) Designations Viewer was employed to identify nearby Special Protection Areas (SPAs) and the respective Qualifying Interest (QI) species for which these sites are designated. The NPWS Designations Viewer also enabled the identification of nationally important biodiversity sites, including Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs), to assess whether these sites support ornithological features of interest. Shapefiles and metadata for designated sites were downloaded and are updated annually for use by Woodrow ecologists on local Geographic Information Systems (GIS).

Following SNH (2016) guidelines on assessing SPA connectivity with the project site, core ranges of species listed as Special Conservation Interests (SCIs) for SPAs were examined to assess connectivity between the project and surrounding SPAs. For certain geese species, such as greylag and pink-footed geese, the largest core ranges are 20 km. Several SPAs within 15km or with a potential source-pathway-receptor connection to the project site were identified.

Records from the National Biodiversity Data Centre (NBDC) and Bird Atlas 2007-11 were reviewed to identify target species that may occur within the 500m turbine buffer and surrounding area, guiding the survey design and highlighting any potential ornithological constraints. Target species focus on red- and amber-listed Birds of Conservation Concern (BoCC). Red-listed species, which are of the highest conservation concern, include those with rapidly declining populations or range, a history of rapid decline without recovery, or those that are globally threatened. Amber-listed species are those with unfavourable European status, occur in internationally important numbers, or are moderately declining in abundance or range, with species in very small numbers also considered amber-listed.

The BirdWatch Ireland Bird Sensitivity Mapping for Wind Energy Development, available on NBDC Biodiversity Maps, was reviewed. For the 22 no. species assessed in Mc Guinness *et al.* (2015), the project site, including the 2km turbine buffer, was classified as having “no data”. Data from the national whooper swan census (Burke *et al.*, 2021), the BirdWatch Ireland barn owl distribution map, and NBDC records were analysed to assess the distribution and proximity of these species to the project site. Historic records and changes in the breeding ranges of species were investigated using Sharrock (1976).

According to SNH (2017) guidance, migratory populations of wintering geese and swans are considered especially sensitive to wind farm developments. To characterize the distribution of these populations, several studies were reviewed during the desk study, including:-

- Lewis *et al.* (2019) for Irish Wetland Bird Survey (I-WeBS) counts;
- Burke *et al.* (2022) for greylag goose distribution;
- Burke *et al.* (2021) for whooper swan distribution; and,
- Fox *et al.* (2021) for Greenland white-fronted goose distribution.

Irish Wetland Bird Survey (IWeBS) data was also consulted as part of the desk study for wetlands located within the 5km of the project site (Irish Wetland Bird Survey, 2024a). IWeBS peak counts and species trends for wintering waterbirds for Lough Gara SPA and Ballyhaunis Lakes were reviewed (Irish Wetland Bird Survey, 2024b and 2024c).

5.2.1.2 Designated Sites

Designated sites are sites of national and international nature conservation importance which are afforded protection as set out in this section.

A Ramsar Site is a wetland designated as internationally important under the Ramsar Convention, an intergovernmental treaty established by UNESCO in 1971 and in force since 1975 (Ramsar Convention Secretariat, 1971). Ireland ratified the Convention in 1985. The treaty acknowledges wetlands as a valuable ecological and cultural resource the loss of which would be irreparable and as such aims to ensure their conservation. It also recognises migratory waterfowl as a shared international responsibility.

Special Areas of Conservation (SAC) are designated under the Habitats Directive. The legislation provides for the protection of certain habitats (listed in Annex I of the Habitats Directive) and/or species (listed in Annex II of the Habitats Directive) within SACs.

Special Protection Areas (SPAs) are designated under the Birds Directive. This allows for the protection of bird species in Annex I of the Birds Directive, regularly occurring populations of migratory species, and important wetland habitats for birds, including within SPAs.

National Heritage Areas (NHAs) are designated under the Wildlife Act 1976 - 2002 (as amended) to protect habitats, species or geology of national importance. Many of the NHAs in Ireland overlap with Natura 2000 sites. Proposed Natural Heritage Areas (pNHAs) are protected on a non-statutory basis by local authorities who have regard for them in planning policies and are sites of significance for wildlife and habitats.

The potential for connectivity with the project was assessed using the available datasets and professional judgement, such as resulting from adjoining watercourses or those in close proximity to the project site. Shapefiles of designated areas in the Republic of Ireland, including SPAs, candidate SPAs (cSPAs), SACs, candidate SACs (cSACs), Natural Heritage Areas (NHAs) and Proposed Natural Heritage Areas (pNHAs) were downloaded from the NPWS website and imported onto Geographical Information Systems (GIS).

5.2.1.3 Non-designated Sites

The *Roscommon County Development Plan (2022-2028)* (Chapter 10.2 - Biodiversity) outlines Natural Heritage Policy Objectives:-

- NH 10.1 Ensure the protection, conservation and enhancement of the biodiversity of the county;
- NH 10.2 Support the implementation of the relevant recommendations contained in the National Biodiversity Action Plan, including no net loss in biodiversity, and in the All-Ireland Pollinator Plan;
- NH 10.3 Implement the County Roscommon Heritage Plan and Biodiversity Action Plan;
- NH 10.4 Proposals where woodland, tree or hedgerow removal is proposed will be required to demonstrate a sufficient level of protection to Annex IV species, such as bats and otter, in accordance with the Habitats Directive;
- NH 10.6 Require all new developments in the early pre-planning stage of the planning process to identify, protect and enhance ecological features by making provision for local biodiversity...having regard to the

recommendations outlined in the Habitat Mapping in Co. Roscommon, 2011 and the County Roscommon Swift Survey, 2020;

- NH 10.13 Encourage the retention of hedgerows and other distinctive boundary treatments in rural areas and prevent loss and fragmentation, where practically possible. Where removal of a hedgerow, stone wall or other distinctive boundary treatment is unavoidable, mitigation by provision of the same type of boundary will be required;
- NH 10.4 Promote and encourage planting of native hedgerow species in new developments; and,
- NH 10.16 Protect and enhance the valuable peatland resource in County Roscommon whilst protecting the heritage and environmental value of these peatland areas. The aims of the National Peatlands Strategy and the implementation of the National Raised Bog Special Areas of Conservation Management Plan 2017-2022 and the Enhanced Decommissioning Rehabilitation and Restoration Scheme will be supported.

5.2.2 ZONE OF INFLUENCE

Shapefiles of designated areas in the Republic of Ireland, including SPAs, SACs, NHAs and pNHAs were downloaded from the NPWS website and imported onto Geographical Information Systems (GIS). The hydrological connectivity of these designated sites to the project site was established.

The Zol of the project is the distance at which ecological features could be significantly affected by the project (CIEEM, 2024). The Zol is likely to vary for different ecological features, depending on how sensitive they are to environmental change.

The Zol depends on the type of development taking place, its likely impacts and the presence of pathways which enable such impacts to affect sensitive ecological features. The Zol may extend a great distance (several kilometres) beyond the project, due to the presence of ecological connections with an ecological feature of interest, for example where there is hydrological connectivity to a designated site via a river network, or for qualifying features, such as mobile species, which range over great distances. In some cases, the Zol of a proposed development may be much smaller depending on the ecological feature being considered. Similarly, ecological features that have no ecological connection with the project are not within its Zol, regardless of their proximity to the project, as no pathway for impacts exists.

The area extending 15km from the project site was considered a sufficient arbitrary distance within which to conduct the initial desktop search and establish a potential Zol. Information obtained during the field surveys identifies ecological features which have the potential to be affected by the project and as such, occur within the Zol of the project.

5.2.3 FIELD SURVEYS METHODOLOGY

An Extended Phase 1 survey, as specified by CIEEM's Guide to Ecological Surveys and their Purpose (CIEEM, 2017), includes a habitat survey and encompasses an assessment of the suitability of habitats and features present to support protected or notable fauna. Extended Phase 1 surveys were undertaken within the project site between 06 September 2023 and 13 May 2025 (**Table 1**). Extended Phase 1 surveys include surveying for habitats, terrestrial invasive alien species, presence of protected and/or notable species, habitat suitability for amphibians and reptiles, habitat suitability and field signs for mammals, potential roost features (PRFs) for bats and the

presence and suitability for any other terrestrial protected habitats and species, excluding aquatics, birds and bats. Each element of the Extended Phase 1 survey is detailed below. Extended Phase 1 surveys were supplemented by additional surveys where more detailed specialised surveys were required. Extended Phase 1 surveys were conducted during the optimum time of year.

The following ecological surveys were undertaken:-

- Habitat mapping (Fossitt, 2000), with Annex I habitat assessments where required;
- Invasive non-native species surveys;
- Terrestrial (non-volant) mammal surveys;
- Bat surveys (compliant with NatureScot *et al.*, (2021));
- Bird surveys (compliant with SNH, 2017 guidance current when surveys were undertaken);
- Aquatic and fisheries assessments (salmon/lamprey suitability, Q-values); and,
- Invertebrate habitat suitability assessment (marsh fritillary).

A summary of the survey types and survey effort completed is provided in Table 1.

Ecological surveys	Description	Dates	Personnel (initials)
Site scoping Annex 5.1 provides more details on Species Records	Initial walkover of site, walkover to identify ecological constraints and inform site layout, undertaking multidisciplinary surveys including habitat mapping, invasive species surveys, amphibian/reptile habitat suitability assessments, mammal surveys and bat habitat assessments (PRF surveys) – Ecological Scoping Report prepared.	2020 06 Sept. 2023	NM Ecology, MC
Habitat surveys Annex 5.2 provides more details for habitat surveys	Habitat descriptions and classification to Fossitt (2000) level 3.	25-28 Sep. 2023, 20 Mar. 2025	MC, BB
	Detailed botanical surveys – Annex I conservation assessment surveys, Irish Vegetation Classification surveys.	11 Jul. 2024, 27-28 Aug. 2024, 10-12 Sept. 2024	MC
	Invasive species surveys	20 Mar. 2025, 13 May 2025.	MC
Protected terrestrial mammals survey Confidential Annex 5.4 and Confidential Annex 5.5 provide more details for mammal surveys	Habitat suitability and field signs surveys for badger, otter, Irish hare, red squirrel, pine marten and other mammals. Recording field signs for terrestrial mammal signs was undertaken during multi-dispersary site walkovers, including when undertaking habitat surveys, bat habitat suitability surveys and bird surveys.	05-06 Mar. 2025, 27 Mar 2025	DC, AW
Aquatic & Fisheries Assessment	Salmon/lamprey suitability surveys (River Hydro morphology Assessment Techniques - RHAT) and baseline water quality assessment (Q-values). Also conducted	25-26 Sep. 2024, 10-11 Oct. 2024, 06-07 May 2025	DC, JOC, ROC

Ecological surveys	Description	Dates	Personnel (initials)
Annex 5.12 provides more details for Freshwater Ecology	otter survey and kingfisher habitat suitability assessment surveys		
Bird surveys Annex 5.7 (& Appendices) provide more details for Ornithology Confidential Annex 5.8 provides more details for Hen Harrier surveys Annex 5.9 provides more details regarding the Collision Risk Modelling (CRM)	Vantage point (VP) watches 4 VPs x 36 hours/VP/ season (minimum) Total: 4-year study with 578.25 VP hours collected	Non-breeding season 2019-2020	KW, PD
		Breeding season 2020	KW, PD
		Non-breeding season 2020/21	KW, PD
		Breeding season 2021	KW, PD
		Non-breeding season 2021/22	KW, PD
		Breeding season 2022	KW, PD
		Non-breeding season 2022/23	KW, PD
		Breeding season 2023	KW, PD
	Winter walkover surveys	Non-breeding 2019/20 – non-breeding 2022/23	KW, JB, DR
	Breeding bird walkover survey	Breeding season 2020, 2021, 2022, 2023	DR
	Dusk woodcock/snipe surveys	Breeding season 2020, 2021, 2022, 2023	DR
	Wider area wintering waterbird surveys	Non-breeding season 2019/20, 2020/21	KW, JB, DR
	Hen harrier roost searches	Non-breeding 2020/21, 2021/22, 2022/23 and 2024/25	PD, DR, GO, AM, DL, AS, JB, JB2, JOC, SP, LMS
	Wider area (2 km turbine buffer) breeding raptor surveys	Breeding season 2020, 2021, 2022, 2023	KW, PD, JB
Bat surveys	Habitat suitability assessment, Ground Level Tree assessment and potential roost assessment surveys	2023 - 2025	OOS, PP, KOR and DMcA

Ecological surveys	Description	Dates	Personnel (initials)
Annex 5.6 provides more details for Bat Surveys	Building inspection under license	2023	OOS, KOR and FH
	Assessment of proposed tree felling areas for bat roost suitability	2023	OOS, DMcA, KOR and PP
	Bat roost suitability along grid connection route	2025	DMcA
	Deployment of static bat detectors Three deployments of minimum 10-nights covering spring, summer & autumn	Spring –autumn 2023	OOS, FH, KOR, ROC and PP
	Weather station (3G remote data)	Spring – autumn 2023	OOS and PP
	Emergence/ re-entry surveys	Spring – Autumn 2023	KOR and OOS
Amphibian & reptile Annex 5.10 provides more baseline details for Herpetofauna (Amphibians and Reptiles)	As part of a multidisciplinary approach to surveying, where identified in the field the presence of smooth newt and common lizard were recorded.	28 Aug 2024, 19 Sep. 2024, 05-06 Mar. 2025	MC
Invertebrate surveys Annex 5.11 provides more baseline details for invertebrates	Habitat suitability assessment for marsh fritillary and larval web searches were undertaken and species recorded if found to be present.	27 Aug. 2024, 19 Sep. 2024	MC

Table 1: Ecological survey dates and surveyor initials.

5.2.3.1 Habitat and Vegetation Survey Methodology

Habitats within the project site, were mapped between September 2023 and September 2025. Habitat survey visits were concentrated within the footprint of the project and targeted to turbine hardstands, construction compounds, access tracks and turbine component haul route. These areas were surveyed and ecological features of interest were recorded using ArcGIS Survey123. ArcGIS Survey123 is an application which is used to record geolocated data digitally in the field. During the survey, consideration was given to identifying important or protected habitats, such as Annex I habitats, terrestrial invasive alien species, and habitats with the potential to support protected species.

Habitat surveys and mapping was undertaken following best practice guidelines (Smith *et al.*, 2011), with all habitats classified into recognised communities defined by Fossitt (2000) and cross-referenced to Irish Vegetation Classification and Annex I habitat types.

A series of 51 no. quadrats were taken across the project site. Detailed vegetation lists were taken for each quadrat, and the species vegetation cover was noted using the DOMIN scale of cover/abundance (**Annex 5.2**).

Particular attention was paid to searching suitable habitats for rare or protected flora species to determine whether they were present within, or close to, the project. Those species listed on the FPO are afforded legal protection under the Wildlife Act 1976, as amended.

For the turbine component haul route, habitats were mapped using high-quality aerial imagery on ArcGIS Pro with verification of habitats completed by visual inspections made during drive-by surveys.

Full details on habitat and vegetation surveys can be found in **Annex 5.2**.

Annex I Assessments Methodology

Specialist botanical surveys were undertaken at each quadrat location to assess the conservation status of Annex I habitat types. Annex I assessments followed best practice (Perrin *et al.* 2014). Site visits were made during the ideal months for assessing the relevant habitats, which for blanket bogs is year-round, but surveys are particularly optimal from March to October (Perrin *et al.* 2010:16) during the main growing season.

The habitats listed in Annex I of the Habitats Directive require protection by means of designation and management of SACs, because these habitats are under threat in the EU and much of the global resource of the habitat occurs within EU territory. A subset of these habitats are Annex I priority habitats, which are those habitats threatened with disappearance and, accordingly, merit special conservation measures (DEHLG, 2009).

It is important to note while these Annex I habitat types have been identified within the project site; the project site itself is not located within an SAC (including cSACs) or SPAs (including pSPAs) or any other protected area within the Natura 2000 network.

Full details on EU Annex I assessment surveys can be found in **Annex 5.2**.

5.2.3.2 Terrestrial (Non-volant) Mammal Survey Methodology

The project area was systematically surveyed for protected mammal species during March 2025 (**Table 1**). The focus of mammal surveys was to identify the presence of otter (*Lutra lutra*) or their resting places such as layups or holts (Reid *et al.*, 2013), and badger (*Meles meles*), or their resting places/setts (Smal, 1995). Based on habitat availability, surveyors looked for evidence for other mammals which would be likely to occur, including pine marten (*Martes martes*), red squirrel (*Sciurus vulgaris*) and Irish mountain hare (*Lepus timidus* subsp. *Hibernicus*). Signs and/or sightings of invasive mammals, like the American mink (*Neovison vison*) and grey squirrel (*Sciurus carolinensis*), were also recorded during surveys.

The survey approach included the identification of suitable habitat, detection of field signs such as tracks, markings, feeding signs, droppings and scent-points as well as by direct observation. The surveys were undertaken by experienced surveyors in line with survey competency guidelines by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2013) and giving cognisance to Irish survey guidelines, such as those produced by Transport Infrastructure Ireland (TII, formally NRA) (NRA, 2009).

Given the characteristics of the project, it was deemed sufficient to extend the mammal survey to 150m up- and downstream of the project site for otter, and to 150m for badger (to cover blasting and piling as required) and red squirrel (NRA, 2006; NRA, 2008; Nature Scot, 2024). Similarly, suitable habitat within 250m of the project site was surveyed where possible for pine marten (Nature Scot, 2018). During mammal surveys,

any forestry edges, rides or accessible areas were searched for red squirrel and pine marten field signs, holts or dreys. A final mammal survey of the works corridor including the turbine delivery route was completed in October 2025.

5.2.3.3 Bat Survey Methodology

Full details of the bat surveys are provided in **Annex 5.6**. Surveys were undertaken during the 2023 to 2025 bat activity seasons, with the survey design informed principally by NatureScot (2021) guidance for onshore wind energy developments and by the bat survey guidance current at the time of each survey. Potential roost features in trees and structures were assessed using Collins (2016) where surveys pre-dated publication of Collins (2023). Following publication of the fourth edition in October 2023, the terminology and presentation of the results were reviewed against Collins (2023). This does not retrospectively change the methods used, and any material differences or limitations are identified in **Annex 5.6**. The assessment considered features capable of supporting maternity, hibernation or swarming roosts and the suitability of habitats for foraging and commuting bats. The following sections describe the methods applied.

Bat Habitat and Potential Roost Assessment NatureScot *et al.*, 2021 recommends that:-

“...features that could support maternity roosts and significant hibernation and/or swarming sites (both of which may attract bats from numerous colonies from a large catchment) within 200 m plus rotor radius of the boundary of the project should be subject to further investigation”.

Turbine specification, as well as locations, are regularly altered during the design phase of projects, and as a precaution Woodrow conduct roost assessment surveys within 300m of the potential build area. Features along the access tracks between turbines (within c. 30m) were also assessed for roost features. A desk-based roost and foraging habitat assessment of the wind farm site were undertaken by NM Ecology Ltd. during March 2020, as part of a scoping exercise. This scoping assessment was ground-truthed by Woodrow in March 2023 on the original project site and the further extension to the project site.

The preliminary assessments were undertaken using the criteria in Collins (2016), which was the relevant edition when the principal 2023 surveys commenced. Structures were assigned negligible, low, moderate or high suitability for roosting bats, and habitats were assessed for their suitability for foraging and commuting bats. Collins (2023) was published in October 2023 and introduced revised terminology for tree PRFs. Accordingly, the tree results are also presented using the PRF-I and PRF-M categories in **Table 3**. This updated presentation does not imply that survey work undertaken before October 2023 followed guidance that had not yet been published.

All external inspections of buildings and structures were conducted under a derogation licence, which legally permitted surveyors to search for bats in areas where roosting was considered likely or possible. This licence allowed access and assessment methods that could otherwise constitute a disturbance to bats or their potential roosts. Only non-invasive techniques were employed during these inspections. Trees were assessed separately from the ground (up to 3m in height), which did not require a licence as there was no direct disturbance to PRFs.

Based on the findings of the PRA, features classed as having moderate to high suitability for bats and/or demonstrating likely occupancy, (e.g., evidence found to be present) were targeted for further surveys.

Surveyors utilised the assessment criteria described in Collins (2016) which provides guidelines for assessing potential suitability of habitat features as bat roosts and for foraging bats. Collins guidance is provided in **Table 2**.

Collins (2023) identified that the categorisation outlined in **Table 2** does not work well for trees, and that it is best to categorise trees as per **Table 3**.

Suitability	Description Roosting Habitats	Commuting and Foraging Habitats
None	No habitat features on site likely to be used by any roosting bats at any time of the year (i.e., a complete absence of crevices/suitable shelter at all grounds /underground levels).	No habitat features on site likely to be used by any commuting or foraging bats at any time of the year (i.e., no habitats that provide continuous lines of shade/protection for flight-lines or generate/shelter insect populations available to foraging bats).
Negligible ^A	No obvious habitat features on site likely to be used by roosting bats; however, a small element of uncertainty remains as bats can use small and apparently unsuitable features on occasion.	No obvious habitat features on site likely to be used as flightpaths or by foraging bats; however, a small element of uncertainty remains in order to account for non-standard bat behaviour.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically at any time of the year. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions ^B and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e., unlikely to be suitable for maternity and not a classic cool/stable hibernation site but could be used by individual hibernating bats ^C).	Habitat that could be used by small numbers of commuting bats such as a hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by any other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions ^B , and/or surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only, such as maternity and hibernation – the categorisation described in this table is made irrespective of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland, or water.

^A For example, in terms of temperature, humidity, height above ground level, light levels or levels or disturbance.

^B Evidence from the Netherlands shows mass swarming events of common pipistrelle bats in the autumn followed by mass hibernation in a diverse range of building types in urban environments (Korsten *et al.*, 2015). This phenomenon requires some research in the UK, but ecologists should be aware of the potential for larger numbers of this species to be present during the autumn and winter in large buildings in highly urbanised environments.

^c This system of categorisation aligns with BS 8596:2015 Surveying for bats in trees and woodland (BSI,2015).

Table 2: Guidelines for assessing the potential suitability of project sites for bats, based on the presence of habitat features within the landscape, to be applied using professional judgement (Collins 2023)

Suitability	Description
PRF-I	A tree feature only suitable for individual bats or very small numbers of bats either due to size or lack of suitable surrounding habitats.
PRF-M	A tree feature that has roosting suitability for multiple bats and may therefore be used by a maternity colony.

Table 3: Classification of Tree PRFs (Collins, 2023)

Roost Emergence and Re-entry Surveys

Dusk emergence/dawn re-entry surveys were completed in 2023 to ascertain if PRFs identified during the Preliminary Roost Assessment (PRA) were used by bats. PRFs classified as low or moderate suitability were surveyed twice, at roost emergence or roost re-entry times. Surveys commenced 15-mins before sunset and up to 1.5-hours before sunrise in accordance with Collins *et al.* (2016). Dusk emergence/dawn re-entry surveys were undertaken using Elekon Batlogger M bat detectors to collect geo-referenced records of bat activity, which were then analysed using BatExplorer software. Survey times and roost survey effort are shown in **Table 4** below.

Date	Start time	End time	Location	Survey type	Weather Conditions
04 Aug 2023 (Sunrise: 05:45)	03:45	06:00	53.93857, -8.588342	Re-entry Survey derelict building (K. O'Reilly & D. Lavelle)	Wind: 2m/s Temp: 15°C Oktas: 2 Precipitation: Dry Other: full moon
30 Aug 2023 (Sunset 20:30)	20:15	22:00	53.93857, -8.588342	Emergence Survey - derelict building (K. O'Reilly & F. Hintze)	Wind: 0 m/s Temp: 15°C Oktas: 8 Precipitation: Intermittent light rain

Table 4: Summary of Roost Emergence/Re-entry Survey Effort

Bat Activity Transect

The NatureScot (2021) guidance considers the application of transect surveys to be discretionary, with survey requirements designed on a site-by-site basis. Transects are complementary to data collected from static bat detectors. They can be material for identifying flight lines and for providing context in relation to bat abundance. Typically, either prior to a dawn re-entry survey or after a dusk emergence survey a bat activity transect survey of the study area (as defined at **Annex 5.6** – Figure 2) was conducted. The transects carried out in 2020 were used to provide supplementary data coverage.

Static Bat Detector Deployment Methodology

The NatureScot (2021) guidance document supersedes some aspects of the previous guidelines. As a minimum, the latest NatureScot (2021) guidelines require three

deployments of static detectors aimed at covering spring (April to May), summer (June to mid-August) and autumn (mid-August to October), each with a minimum deployment period of 10 nights (within compliant weather parameters). Seasonal deployments of static detectors are set out at all potential turbine locations for proposals comprising ten or less turbines, with a third of any additional locations also covered up to a maximum of 40 detectors. Compliant weather conditions are defined as: temperatures at $\geq 8^{\circ}\text{C}$ at dusk, maximum ground level wind speed of 5 m/s and no, or only very light, periodic rainfall. Static detector surveys were undertaken on three occasions covering spring, summer and autumn in 2023 (**Table 5** and **Table 6**). Equipment used included Wildlife Acoustics Song Meter 4 BAT Full Spectrum (SM4BAT-FS, with a SMM-U2 microphone). A sampling rate of 384 kHz was set for detectors, and recording was scheduled to be continuous subject to triggering from 30-minutes before sunset until 30-minutes after sunrise, for a minimum of 10 no. weather-compliant nights. Static bat detectors were deployed to record the types of bat species present and to provide an overview of how bat activity is broadly distributed over the study area at given habitat features and specifically at selected turbine locations. This provides context to bat activity within the project site to supplement and provide a comparison for the turbine locations, for example comparing bat activity along habitat features vs bat activity in open areas removed from habitat features, emulating post-construction conditions around turbines.

At some locations, access, land-use or equipment constraints meant that detectors were not positioned at the exact proposed turbine coordinates. Detector locations and their associated habitat context are therefore reported transparently in **Table 6** and **Annex 5.6**. Data from detectors positioned within forestry or beside linear habitat features may record greater activity than would occur in open habitat at a turbine location. Such records were interpreted in their spatial context and were not treated as a direct measure of activity at an unsampled turbine coordinate.

Season	Deployment date	Collection date
Spring	26-April-2023	11-May-2023
Summer	27-June-2023	14-July-2023
Autumn	30-August-2023	13-September-2023

Table 5: Static Detector Deployment Dates for each Season

Map ID	Associated feature	Spring Deployment		Summer Deployment		Autumn Deployment	
		Unit	Run time	Unit	Run time	Unit	Run time
D.01	In open field	WSS037	16 nights 9,436min	WSS030	18 nights 8,966min	WSS075	15 nights 10,531min
D.02	In open field	WSS075	16 nights 9,436min	WSS083	18 nights 8,966min	WSS052	2 nights 1,351min
D.03	On a strip of alder divide, with a drainage ditch to the east and spruce forestry to the west	WSS076	16 nights 9,436min	WSS074	18 nights 8,966min	WSS064	11 nights 8,351min
D.04	Within plantation gap with boggy ground within 25m north	WSS070	16 nights 9,436min	WSS040	18 nights 8,966min	WSS034	15 nights 10,531min
D.05	Placed in bog with scrub	WSS061	16 nights 9,436min	WSS059	18 nights 8,966min	WSS037	15 nights 10,531min
D.06	Mixed woodland edge with improved grassland	WSS079	16 nights 9,436min	WSS078	18 nights 8,966min	WSS024	15 nights 10,531min
D.07	In open field	WSS030	16 nights 9,436min	WSS031	18 nights 8,966min	WSS082	15 nights 10,531min
D.08	On tree beside forestry and drain	WSS033	16 nights 9,436min	WSS077	18 nights 8,966min	WSS072	15 nights 10,531min
D.09	On forestry edge	WSS072	16 nights 9,436min	WSS072	18 nights 8,966min	WSS075	15 nights 10,531min
D.10	On bog with scrub	WSS038	16 nights 9,436min	WSS082	18 nights 8,966min	WSS052	15 nights 10,531min
D.11	On elder tree beside forest and open pasture	WSS059	16 nights 9,436min	WSS080	18 nights 8,966min	WSS029	15 nights 10,531min

Table 6: Static Detector Survey Effort and Location

Bat data analysis methodology

For data collected using Song Meter 4 BAT Full Spectrum (SM4BAT-FS) detectors, analysis of sound recordings was undertaken using Kaleidoscope Pro software to confirm species, or genus for myotis species and pipistrelle species social calls, and exact number of bat passes for each transect survey or static deployment. For data collected using the Batlogger M (Elekon) detectors, analysis of sound recordings was undertaken using BatExplorer software. This analysis aimed to confirm species (or genus for *Myotis* species) and bat activity (exact number of bat passes) for each deployment and transect survey. All sound files were run through Kaleidoscope Pro's auto-identification (Version 5.6.3), and then manual verification was undertaken by Woodrow operatives. Russ (2012), Middleton *et al.* (2014), and Middleton *et al.* (2022) were used to aid in the species identification of bat calls during data analysis.

Recordings of common and soprano pipistrelles for which Kaleidoscope determined a match ratio of 100% (meaning every recorded call matched the known species call parameters) were deemed accurate to a degree that did not necessitate manual verification. Nevertheless, all other automatically identified bat species were subjected to manual check, which is above the recommended 10% manual verification outlined in SNH *et al.* (2019) and NatureScot *et al.* (2021).

Recordings automatically identified as noise were determined to fall outside of the recording parameters for the survey and were classified as noise. Any calls showing up as "NoID," in which the software cannot identify any species, were also checked and manually identified.

Bat activity was measured by the number of bat passes recorded. Bat passes are commonly used as a metric for bat activity and determine species presence (Kerbirou *et al.*, 2018). Therefore, a bat pass was defined as the detection of one or more bat calls from a single species within a 15-second sound file. Recordings in which multiple species (or individuals) were recorded were split into separate bat passes. The number of bat passes was considered synonymous with registrations, as defined by commonly accepted practice, which refers to species presence within a 15-second sound file.

Geographical and temporal context for activity levels was then examined through internal comparative analysis. Woodrow has developed an in-house analysis for static data collected. Mean and median bat passes per hour were generated using statistical software R. In order to provide an appropriate test of activity within the project site, Woodrow analysis compares activity levels with other wind farm developments from its own database to provide comparative activity levels.

Activity levels are assessed using the criteria applied by Matthews *et al.* (2016). This study examines the risk of European bat species to wind energy developments in the UK. Woodrow has adapted the Matthews *et al.* (2016) scale of activity per night to a scale of bat passes per hour for resident species of Ireland. This adaptation uses an average of 10-hours per night across the active bat season to determine the cut-off of high activity. **Table 7** shows the adapted activity levels. The output is then converted to show the mean and median activity levels that can then be used to determine a risk assessment in relation to bat activity. It should be noted that presenting mean activity levels can be highly misleading where the data are highly skewed, as is frequently the case with bat activity at wind turbines (Lintott & Mathews, 2018). A judgement can then be made on which is the most relevant.

The results are presented at both local level (per detector) and site scale to allow assessment of activity.

Classification	Bat passes per hour
Low	<1.99
Medium	2 – 4.99
High	≥5

Table 7: Activity level classification as per Mathews et al. 2016 adapted to hourly activity levels

Bat risk assessment methodology

No Republic of Ireland guidance provides a complete method for assessing collision risk to bats from onshore wind turbines. The assessment therefore draws on NatureScot (2021) and NIEA (2021), with professional judgement applied to the Irish context and the site-specific survey results. The NIEA guidance is relevant because it addresses the Irish resident bat assemblage, although population context and conservation status are not assumed to be identical between Northern Ireland and the Republic of Ireland. Potential effects other than collision, including habitat loss, severance, disturbance and lighting, were considered with reference to NatureScot (2021), Bat Conservation Ireland guidance, Marnell *et al.* (2019, 2022), NPWS (2019) and Roche *et al.* (2014), as applicable.

NatureScot (2021) describes a two-stage framework for considering potential collision risk, combining habitat and project characteristics (**Table 8**) with species vulnerability and recorded activity. The detailed criteria applied are provided in **Annex 5.6**. In this assessment, the framework is used as a structured aid to professional judgement rather than as a standalone prediction of collision mortality. Site-level and detector-level activity, the distribution of records, detector placement, species vulnerability and relevant limitations were considered together. **Table 9** presents the matrix used to support the overall risk categorisation.

To interpret **Table 10**, the overall collision risk assessment adheres to the following categories:

- Overall collision risk assessment of 0-4 is Low risk;
- Overall collision risk assessment of 5-14 is Medium risk; and,
- Overall collision risk assessment of 15-25 is High risk.

Site Risk Level (1-5)		Project size		
		Small	Medium	Large
Habitat Risk	Low	1	2	3
	Moderate	2	3	4
	High	3	4	5

Table 8: Stage 1 site risk assessment based on habitat and project size (as outlined in NatureScot 2021)

Site risk level	Nil	Low (1)	Low-Moderate (2)	Moderate (3)	Moderate-High (4)	High (5)
Low (1)	0	1	2	3	4	5
Moderate (3)	0	3	6	9	12	15
High (5)	0	5	10	15	20	25

Table 9: Stage 2 Collision Risk Matrix for Bats at Wind Turbine Developments (adapted from NatureScot, 2021)

Ireland		Collision risk		
		Low	Medium	High
Relative abundance	Common species	-	-	Common pipistrelle Soprano pipistrelle
	Rarer species	Myotis species Brown long-eared bat Lesser horseshoe bat	-	Leisler's bat
	Rarest species	Whiskered bat Natterer's bat	-	Nathusius' pipistrelle

Table 10: Level of collision risk to individual bats from wind turbines. (Adapted from Wray *et al.*, 2010)

An initial (Stage 1) potential risk assessment for the project site was carried out using the risk assessment matrix provided in NatureScot guidance (NatureScot, 2021). For habitat risk, *Moderate* was entered into the matrix as the wind farm site was assessed to have the following 3 no. conditions from the *Moderate* risk habitat section:-

- Buildings, trees or other structures with moderate-high potential as roost sites on or near the project site;
- Habitat could be used extensively by foraging bats; and,
- Site is connected to the wider landscape by linear features such as scrub, treelines, and drainage ditches.

For project size, the medium category was selected, as it features aspects from the medium (wind farm developments within 5km), medium (10 turbines) and large category (turbines over 100m in height). These parameters returned a site risk score of 3, which is considered a medium site risk.

The next of step of the risk assessment (Stage 2) uses a second matrix to derive an overall risk assessment based on the activity level of high collision risk species, which in this instance are Leisler's bat, common pipistrelle, soprano pipistrelle, and Nathusius' pipistrelle. The Stage 2 - risk assessment matrix is reproduced in **Table 10** and for each

of the four high collision risk species the activity score is multiplied by the project site risk score, which as stated above was determined to be 3 – medium risk site.

5.2.3.4 Bird Survey Methodology

Vantage Point

Vantage Point (VP) surveys were conducted to characterise flight activity and use of the project site and surrounding area by target bird species, and to inform collision risk and displacement assessments. The surveys aimed to undertake a minimum of 36-hours of VP observations per location each season:-

- Non-breeding season 2019/20 - October 2019 - February 2020;
- Breeding season 2020 – March – August;
- Non-breeding season 2020/21 September 2020 – March 2021;
- Breeding season 2021 – March – August;
- Non-breeding season 2021/22 – October 2021 – March 2022;
- Breeding season 2022 – March-August;
- Non-breeding season 2022/23 December 2022 – March 2023; and,
- Breeding season 2023 – April - September

VP observations involved stationary monitoring of birds using binoculars and a spotting scope, in accordance with Scottish Natural Heritage (SNH) guidelines (SNH, 2017). Upon sighting a target species, the bird's estimated flight height and its use of the area were recorded by mapping its flight path and noting its behaviour. Flight heights were visually estimated, often using known landscape features as reference points. Additional data collected included the number of birds, time of detection, flight duration, and, where applicable, sex and age class. Incidental sightings of non-target species were also recorded but were not prioritised.

Initially, 3 no. VPs were chosen to cover the 500m buffer. During the non-breeding season of 2021-2022, in response to a revised turbine layout, VP1 was relocated approximately 50m to the west, and a new VP4 was introduced in the northern part of the project site. All VPs were placed following best practice guidelines, which stipulate that viewsheds should not exceed 2km in distance and should cover no more than a 180-degree arc (SNH, 2017). To avoid duplicate records, simultaneous surveys from overlapping viewsheds were prevented. To minimise observer fatigue, surveyors were limited to 3-hour VP observation sessions without breaks, except in cases of inclement weather, when surveys were paused until conditions improved.

Breeding Bird Survey

The breeding bird study area was defined as a 500m turbine buffer. Breeding bird surveys were undertaken during Year 1 (breeding season 2020), Year 2 (breeding season 2021), Year 3 (breeding season 2022) and Year 4 (breeding season 2023).

The objective of breeding bird surveys, conducted in accordance with best practice guidelines, is to document the abundance and distribution of breeding bird species within the project site (SNH, 2017). The survey methodology employed a range of techniques tailored to specific habitat types and anticipated species, as identified in

the desk-based study. These methods were selected based on factors such as proximity to designated sites, habitat availability, and the associated avian assemblages.

Breeding wader surveys were carried out following an adapted Brown & Shepherd (1993) methodology, in line with SNH (2017) guidelines. Surveys were spaced a minimum of 7-days apart to cover the full breeding season, from mid-April to early July. During these surveys, all encountered bird species were recorded, including notes on their behaviour and breeding status. In addition, suitable wetland areas within the 500m turbine buffer zone were surveyed for breeding snipe. Surveys were conducted during dawn until 3-hours after, or in the late afternoon until dusk, as per O'Brien & Smith (1992), to maximise the likelihood of detecting breeding behaviours such as chipping or drumming by snipe.

Non-breeding Walkover Surveys

Walkover surveys were conducted within the 500m turbine buffer. Surveys were undertaken in Year 1 (non-breeding season 2019/20), Year 2 (non-breeding season 2020/21), Year 3 (non-breeding season 2021/22) and Year 4 (non-breeding season 2022/23). Surveyors systematically traversed the area, documenting all species encountered and ensuring comprehensive representation of all habitat types present on site. These surveys yielded important data on the distribution of bird species across the project site and their use of various habitat types. This approach is especially useful for detecting species that are difficult to observe during vantage point (VP) watches, such as secretive wintering waders like woodcock.

Breeding Raptor Survey

Breeding raptor surveys were undertaken in Year 1 March - July 2020, Year 2 March - July 2021, Year 3 March - August 2022, and Year 4 April to July 2023, following the methodologies detailed in Hardey *et al.* (2013) and consistent with NatureScot guidance (2017).

The survey area was defined as a 2km buffer of the turbine layout to encompass all habitats suitable for breeding raptors. Surveys covered all accessible areas of suitable nesting and foraging habitat within this buffer.

Survey methods involved a combination of ad-hoc VP locations positioned to overlook key habitat features, and systematic walkover surveys to identify evidence of breeding activity. Surveyors looked for evidence including displaying, territorial, or nesting behaviour, as well as the presence of occupied nests, recently fledged young, or alarm-calling adults.

Non-breeding Waterbird Survey

In assessing the ornithological baseline, it is crucial to gather data on the abundance of waterbirds in the surrounding area, particularly regarding their potential use of the project site. Non-breeding waterbirds surveys were undertaken between November 2019 to January 2020 and October 2020 to March 2021. SNH guidelines recommend monitoring swan and goose foraging and roosting sites in the vicinity of the project site, especially when SPAs are designated for species utilising the project site (SNH, 2017). Recommended study areas include up to 500m from the project site for

foraging locations and up to 1km for roosting sites, although this radius may be expanded if high levels of activity are anticipated (SNH, 2017).

In Ireland, the distribution of swans and geese is inadequately documented beyond designated sites, and many wintering waterbirds are found outside of SPAs. As a result, the number of survey visits was adjusted based on the observed level of waterbird activity. The surveys adhered to the methodology of the Irish Wetland Bird Surveys (I-WeBS) and extended up to 5km from the project site to encompass habitats suitable for foraging and roosting wintering waterbirds.

Hen harrier Roost Surveys

The SNH (2017) guidelines require the identification of communal raptor roosts, including those of hen harriers, within 2km of a project. Consequently, the 2km turbine buffer zone was surveyed.

An initial hen harrier roost investigation was undertaken during winter 2019/20 following observations of hen harrier activity on site. Subsequent targeted roost surveys were undertaken October 2020 to March 2021, October 2021 to March 2022, December 2022 to February 2023 and October 2024 to March 2025.

The methodology for surveying hen harrier roosts is influenced by two key factors:-

- Any hen harrier activity recorded during vantage point (VP) watches, site walkovers, and broader area surveys; and,
- The presence of potentially suitable roosting habitats near the project site, as outlined by Clarke & Watson (1990) and in the Irish national hen harrier winter roost survey guidelines (O'Donoghue, 2019).

SNH (2017) references Hardey *et al.* (2013) for detailed roost survey methodology, emphasizing the use of professional judgment to identify and prioritise potential roost sites based on observed flight activity within or near the project site. Further guidance for locating roosts includes tracking birds in the late afternoon and following their flight paths back to roost sites. O'Donoghue (2019) recommends that roost watches be conducted for at least 40-minutes before sunset until dark, or 30-minutes before sunrise until at least 30-minutes after sunrise. The specific dates for hen harrier roost watches are provided in the survey effort in **Annex 5.7** and discussed in more detail in **Annex 5.8**.

Once a roost is identified, additional monitoring is required to document roost attendance and track flight paths to and from the roost in relation to the project site. Further monitoring is typically conducted based on the frequency of roost occupancy and the proximity of the roosting birds to the project site.

5.2.3.5 Aquatic Ecology Survey Methodology

Aquatic surveys were conducted at 11 no. locations on, and adjacent to, the project site in September and October 2024, and May 2025. The aquatic study area was defined as watercourses which drain into and form part of the Owengarve_010 (IE_WE_34O030050), as well as the Lung_050 (IE_SH_26L030400). Both river sub basins form parts of separate catchments, with the Owengarve draining into the Moy Killala Bay catchment in the west, and the Lung draining into the Upper Shannon catchment in the east. Surveys included the follow elements:-

- Benthic macroinvertebrate Q-value assessments were conducted at seven survey sites located on the Owengarve River and Lung River. Biological scoring was undertaken by adopting a sampling method currently employed by the EPA (Toner *et al.*, 2005);
- Water quality grab samples were collected in 1-litre pre-sterilised sampling bottles at 7 no. locations. Samples were transported to an accredited laboratory for analysis for selected water quality parameters;
- For freshwater pearl mussel, a broad appraisal / overview of the upstream and downstream habitat at each aquatic survey site was undertaken to evaluate the potential for this species to be present within the project;
- To ascertain the possibility of crayfish occurring within the study area, a qualitative assessment (i.e. presence/absence) was carried out at 4 no. surveys sites. A trapping survey was undertaken using 2 no. strings of 4 no. trappy funnel crayfish traps. Sweep netting and hand-searching (following Reynolds *et al.*, 2010) was also utilised at survey sites; and,
- Fish habitat surveys were conducted at 6 no. separate locations along the Owengarve River and Lung Rivers, following methodology outlined by Hendry & Cragg-Hine (1997). Habitat types pertaining to salmonids and lamprey sp. were noted and their locations were drawn onto a field tablet resulting in a mosaic of the different habitat types represented on a map.

5.2.3.6 Amphibians and Reptiles

The project site has the potential to support suitable habitat for common frog (*Rana temporaria*), smooth newt (*Lissotriton vulgaris*), and common lizard (*Zootoca vivipara*).

During initial Phase 1 surveys and subsequent site visits, any direct observations of common frog, smooth newt, and common lizard were recorded.

The common frog is listed in Annex V of the Habitats Directive. Dedicated frog surveys were not considered necessary. Frogs were recorded on an *ad hoc* basis when observed during multi-disciplinary surveys, with particular attention given to potential breeding sites and areas found to be supporting frog spawn.

Smooth newt are protected under the Wildlife Act 1976 (as amended). The species prefers water features that are relatively small (<200m²) and shallow (0.5-1m deep). In addition, there should be aquatic broadleaved vegetation and leaf debris (O'Neil *et al.*, 2024) if these water features are to support breeding newts. The water quality should be good with abundant invertebrate activity and a lack of fish or waterfowl (ARG UK, 2010). The expansive network of ditches across the project site are considered potentially suitable habitat for the species. This was considered adequate to assume their presence within the project site and specific newt surveys were not conducted.

The common lizard is protected under the Wildlife Act 1976 (as amended). Common lizard is associated with bogs in Ireland, and as such the project site is likely to support the species (Irish Wildlife Trust, 2017). Multi-disciplinary visual encounter searches were completed in 2024 within the optimal lizard survey periods (April, May and September) and under optimal weather conditions (Edgar *et al.* 2010, NatureScot 2024). These were considered adequate to gauge presence within the project site and no refugia mat surveys were conducted.

5.2.3.7 Invertebrates

Habitat Condition Assessments

Habitat condition assessments for marsh fritillary (*Euphydryas aurinia*) were conducted at 2 no. locations within the project site, where the density of devil's-bit scabious (*Succisa pratensis*) was frequent to abundant. Best practice guidance on conducting habitat condition assessments for marsh fritillary was followed and is summarised here (NBDC n.d. a):-

- Surveys were conducted on 27 August 2024 and 19 September 2024, which is during the flowering period for devil's-bit scabious (*Succisa pratensis*) from mid-August to mid-October;
- A structured walk (zigzag) was conducted to sample a representative area of the habitat;
- Every 10m surveyors stopped to fill out the habitat condition assessment sheet with more than 40-records recommended for a survey area between 1-5 ha; and,
- Records were taken on vegetation height, abundance of devil's-bit scabious, vegetation structure, evidence of grazing and scrub cover.

Larval Web Surveys

Larval web surveys for marsh fritillary were conducted across the 2 no. locations considered likely suitable for the species within the project site. Surveyors followed the best practice guidance for marsh fritillary larval web surveys, which have been summarised here (NBDC n.d. b, DEARA 2017):-

- Surveys were conducted on 27 August 2024 and 19 September 2024, which is within the optimum survey seasons (late August-early September or mid-February-early April) when webs are most conspicuous;
- Surveys were conducted during favourable weather conditions (heavy rain may destroy the webs);
- The extent of the potential supporting habitat was mapped;
- A walked 100m transect was conducted at each survey location, which covered a representative sample of the habitat;
- A thorough search for larval webs is conducted within a 1m buffer either side of the 100m transect;
- The location of any larval webs was recorded and photographed; and,
- The number of larval webs identified per 100m transect was identified.

5.2.3.8 Survey Limitations

Overall, survey limitations detailed above are not considered likely to affect the validity or robustness of the impact assessment. In all cases, a precautionary approach has been taken at an appropriate scale, and mitigation measures included to fully protect protected species and habitats.

Survey Limitations for Habitats

Survey timing was largely within the optimal survey period for flora identification; however, some surveys were undertaken outside the flowering period meaning plants were identified using a vegetative key. As such, late surveys did not impact the classification of habitat types.

Survey Limitations for Bats

The weather data for the spring deployment period (26 April – 11 May 2023) was fully compliant with NatureScot *et al.* (2021) guidance for weather conditions. Out of the 15 nights deployed, five were non-compliant (28 April, 5 May, 6 May, 8 May and 10 May) due to rainfall. This meant that 10 of the deployment nights were compliant with required weather conditions. The weather data for the summer deployment period (27 June – 14 July 2023) was fully compliant with the NatureScot *et al.* (2021) guidance for weather conditions, only 7 July was non-compliant due to rainfall. The weather data for the autumn deployment period (30 August – 13 September 2023) was compliant with the NatureScot *et al.* (2021) guidance for weather conditions with the only exceptions being on 31 August and 11 September. There was a non-recording of weather data for 12 and 13 September, but this has not impacted on overall results.

Due to reasons relating to access and habitat structure, bat equipment could not always be setup at exact proposed turbine locations, e.g., when proposed turbine locations are in dense conifer plantations. This was the case at D.03 where the detector was placed approximately 15m from the exact turbine location. The detector was placed on the edge of the forestry plantation as opposed to the interior as the interior was inaccessible due to windfallen trees. While this was not considered to limit the robustness of the data set, it is important to acknowledge the deployment locations in relation to the turbines, as this has implications for interpretation of bat activity. For instance, deploying units away from proposed turbine locations within plantations and along the edge of habitat features is likely to lead to more bats being registered, which may not be a true reflection of activity at a given turbine location.

Survey Limitations for Birds

The majority of ornithological surveys were completed in suitable weather conditions. On occasions where surveys were undertaken in less favourable conditions, weather remained within acceptable limits for the survey methods employed and did not materially affect survey coverage or the ability to detect target species. Any such surveys are therefore not considered to compromise the robustness of the ornithological baseline or the assessment conclusions.

Survey Limitations for Aquatics

During the aquatic and fisheries surveys, which included surveys for otter, land access and obstacles to movement hindered the ability to survey the targeted 150m either side of watercourse crossing points. In these instances, a visual assessment of the 150m up and downstream of the watercourse crossing was made from a distance, and an accurate assessment of habitat suitability made for the respective aquatic feature. In these instances, if habitat was deemed suitable a precautionary approach was taken and the presence of the species was assumed. This approach was only practicable for non-culverted watercourses due to access limitations.

5.2.4 IMPACT ASSESSMENT METHODOLOGIES

The ecological impact assessment (EcIA) methodology used in this chapter deviates from other EIAR chapters in that it does not follow the guidelines outlined by the EPA (EPA, 2022). Instead, the ecological impact assessment put forward here follows best practice guidance for the UK and Ireland as set out by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2024). The CIEEM guidelines are the acknowledged reference on EcIA for ecological practitioners (CIEEM, 2024). EcIA can be used for the appraisal of projects of any scale including the ecological component of an EIAR. While the chapter differs from others and does not follow EPA guidelines (EPA, 2022), it is subject to the EIA directive (Council Directive 2011/92/EU, as amended by Directive 2014/52/EU, European Parliament and Council, 2014).

This section outlines the approach used to evaluate the importance of the habitats and species present in the study area and the steps followed for the evaluation and characterisation of potential impacts from the project.

5.2.4.1 Evaluating Ecological Features within the Zone of Influence

A definition of Zone of Influence (Zoi) has been provided in **Section 5.2.2**. Those ecological features which occur within the Zoi such as Natura 2000 sites, and threatened habitats or species, are then evaluated in geographic hierarchy of importance. The categories and criteria used for this evaluation are listed in **Table 11**.

Error! Reference source not found. The conservation value of a species record is not determined solely by its legal protection status. Ecological value also reflects factors such as population size, distribution, functional importance and the role of the project site in supporting the species. Approaches to attributing nature conservation value to species have been previously developed for some species groups such as birds and bats. The ecological valuation of bird species is derived from an existing prioritisation framework for the conservation status of birds in Ireland (Gilbert *et al.*, 2021). Best practice guidance on the ecological valuation of bat species, roosts, commuting routes, and foraging areas provides an objective and consistent approach (Wray *et al.*, 2010, NatureScot, 2021).

As per the guidelines, only Important Ecological Features (IEFs), *i.e.* those features evaluated as being of Local Importance (Higher Value) or greater, within the Zoi, are assessed with respect to likely impact.

Importance	Criteria
International	Natura 2000 sites including Special Areas of Conservation (SACs), Site of Community Importance (SCIs), or Special Protection Area (SPAs). Proposed Special Area of Conservation (pSAC) or proposed Special Protection Area (pSPA). Site that fulfils the criteria for designation as a 'Natura 2000 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: 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	Sites, habitats and species populations of importance in a national context. Site designated or proposed as a Natural Heritage Area (NHA) in Ireland. National or Statutory Nature Reserve. Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA), Refuge for Fauna and Flora protected under the Wildlife Act, and/or a National Park. Site containing 'viable areas'[†] of habitat types listed in Annex I of the Habitats Directive. Resident or regularly occurring populations (assessed to be important at the national level in Ireland) of the following: 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 / Regional	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: 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 Ireland); and/or Species listed on the relevant Red Data list. County important populations of species, or viable areas of semi-natural habitats, or natural heritage features identified in the National or Local BAP, if this has been prepared. 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. 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 (Higher Value)	Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared. 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 (Lower Value)	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.

† A 'viable area' is defined as an area of a habitat that, given the particular characteristics of that habitat, was of a sufficient size and shape, such that its integrity (in terms of species composition, and ecological processes and function) would be maintained in the face of stochastic change (for example, as a result of climatic variation).

Table 11: Geographic hierarchy of importance for assessment of ecological impacts.

Source: (NRA, 2009 pp. 16-17)

5.2.4.2 Identification and Characterisation of Impacts

When describing ecological impacts and effects, reference is made to the following characteristics as described in CIEEM guidance (CIEEM, 2024):-

- Positive or negative - positive and negative impacts and effects should be determined according to whether the change is in accordance with nature conservation objectives and policy. A positive change improves the quality of the environment e.g. by increasing species diversity, extending habitat or improving water quality. This may also include halting or slowing an existing decline in the quality of the environment. A negative change reduces the quality of the environment e.g. destruction of habitat, removal of foraging habitat, habitat fragmentation, pollution;
- Extent - The extent is the spatial or geographical area over which the impact/effect may occur under a suitably representative range of conditions (e.g. noise transmission under water);
- Magnitude - Magnitude refers to size, amount, intensity and volume. It should be quantified if possible and expressed in absolute or relative terms e.g. the amount of habitat lost, percentage change to habitat area, percentage decline in a species population;
- Duration - Duration should be defined in relation to ecological characteristics (such as the lifecycle of a species) as well as human timeframes. For example, five years, which might seem short-term in the human context or that of other long-lived species, would span at least five generations of some invertebrate species. The duration of an activity may differ from the duration of the resulting effect caused by the activity. For example, if short-term construction activities cause disturbance to birds during their breeding period, there may be long-term implications from failure to reproduce that season. Impacts and effects may be described as short, medium or long-term and permanent or temporary. These will need to be defined in months/years;
- Frequency and timing - The number of times an activity occurs will influence the resulting effect. For example, a single person walking a dog will have very limited impact on nearby waders using wetland habitat, but numerous walkers will subject the waders to frequent disturbance and could affect feeding success, leading to displacement of the birds and knock-on effects on their ability to survive. The timing of an activity or change may result in an

impact if it coincides with critical life-stages or seasons e.g. bird nesting season; and,

- 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. In some cases, the same activity can cause both reversible and irreversible effects.

However, the assessment only needs to describe those characteristics relevant to understanding the ecological effect and determining the significance; and as such does not need to incorporate all stated characteristics (CIEEM, 2024).

5.2.4.3 Significant Effects on Important Ecological Features

An Important Ecological Features (IEF) is one that requires “specific assessment”, due to potential for significant effect(s) resulting from the project (CIEEM, 2024; 18). These features may include protected sites, habitats, or species which are potentially vulnerable to significant effects because of the project. Detailed assessment is not required for ecological features that are common, not at risk, or those resilient enough to withstand the project's impacts while remaining viable (CIEEM, 2024: 29).

A significant effect is “an effect that either supports or undermines biodiversity conservation objectives” for those ecological features which have been identified as being an important feature of the project site i.e., Important Ecological Features (IEFs) (CIEEM, 2024: 74). IEFs may have conservation objectives which are specific (e.g., for a Natura 2000 site) or broad at a plan level (e.g., national/local nature conservation policy). As such, effects can be considered significant in a wide range of geographic scales from international to local (**Table 11**)Error! Reference source not found.. Consequently, ‘significant effects’ are qualified with reference to the appropriate geographic scale (CIEEM, 2024).

5.2.4.4 Assessment of Residual Impacts and Effects

After characterising the potential impacts of the project and assessing the potential effects of these impacts on IEFs, avoidance or mitigation measures are proposed to avoid and/or mitigate the identified significant effects. Once measures to avoid and mitigate ecological effects have been finalised, assessment of the residual impacts is undertaken to determine the significance of their effects on IEFs.

5.2.4.5 Assessment of Cumulative Effects

Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period or concentrated in a location (CIEEM, 2024). Different types of actions can cause cumulative impacts and effects. As such, these types of impacts may be characterised as:-

- Additive/incremental – in which multiple activities/projects (each with potentially insignificant effects) add together to contribute to a significant effect due to their proximity in time and space (CIEEM, 2024); and,
- Associated/connected – a development activity ‘enables’ another development activity, e.g., phased development, as part of separate planning applications. Associated developments may include different

aspects of the project which may be authorised under different consent processes. It is important to assess impacts of the 'project' as a whole and not ignore impacts that fall under a separate consent process (CIEEM, 2024).

The cumulative effects assessment is presented in **Section 5.9**.

5.3 BASELINE ENVIRONMENT

Baseline conditions represent a summary of the existing environment within the project site before the commencement of works.

5.3.1 DESCRIPTION OF THE PROJECT SITE

The project site is c. 157ha and is in an upland area. The elevation of the project site varies from approximately 139m at T10 to 173m at T3. It is located c. 3.5km at the closest distance to the west of Lough Gara.

Expanses of peatland habitats are abundant throughout the project site and surrounding environs. On-going peat extraction with large-scale machinery is evident in the area surrounding T9 and at T10. Elsewhere, evidence of historical peat extraction is apparent particularly in the immediate vicinity (c. 100m) of the lesser road network (L-5501 and L-55018) across the project site where access is facilitated. Significant expanses of near natural peatland are located between T5 and T6, as well as south of T8 and to the north of T10. Other land use across the project site includes commercial forestry.

5.3.2 EXISTING ECOLOGICAL RECORDS

Records of protected and endangered species noted in the vicinity of the project site were obtained from the NBDC database for the last 10 years. Details of all notable species recorded within the 10km grid squares M69 and G60 are summarised in **Annex 5.1**. Likewise, existing invasive alien species records from within 10km of the project site have been provided in **Annex 5.1**.

5.3.2.1 Designated Sites

There are several international and national sites designated for nature conservation in the wider environs of the project site. A number of these have been identified as having ecological connectivity to the project. Where there are potential ecological links, hydrological connectivity with the project site is the main reason. The spatial relationships and potential connectivity between areas designated for nature conservation and the project are described in the following sections.

Ramsar Sites

Lough Gara Ramsar Site (Site No. 852) is a wetland of international importance and is located c. 3.5km east of the project.

Lough Gara Ramsar Site is a limestone lake. The lake contains numerous low-lying islands and is fringed by many different habitats such as reedbeds, freshwater marsh, peatland, lowland wet grassland and scrub.

The Lough Gara Ramsar Site provides habitat for feeding and roosting waterbirds. More than 1% of the global population of whooper swan (*Cygnus cygnus*) is estimated to visit the lake. The Greenland white-fronted goose (*Anser albifrons flavirostris*) is also

a frequent visitor to the lake. Other wintering waterbirds regularly recorded include mute swan (*Cygnus olor*), tufted duck (*Aythya fuligula*), teal (*Anas crecca*), wigeon (*Anas penelope*), shoveler (*Anas clypeata*), common pochard (*Aythya ferina*), curlew (*Numenius arquata*) and northern lapwing (*Vanellus Vanellus*).

Natura 2000 Sites

Connectivity between the project and a designated site can occur over land, through hydrological or hydrogeological connectivity, or through mobile qualifying feature species using lands outside of the designation. Details of Natura 2000 sites identified with connectivity to the project site, including their qualifying features of interest, are provided in the Appropriate Assessment Report (APEM Group Woodrow, 2026).

The project has been identified as having potential for likely significant effects on the following Natura 2000 sites:

- Bellanagare Bog SPA [004105];
- Bricklieve Mountains and Keishcorran SAC [001656];
- Callow Bog SAC [000595];
- River Moy SAC [002298];
- Tullaghanrock Bog SAC [0002354];
- Lough Arrow SPA [004050]; and,
- Lough Gara SPA [004048].

No Natura 2000 sites at a closest distance greater than 15km to the project site were identified as having hydrological connectivity, or connectivity through any other means. However, the River Moy SAC extends a great distance and as such the Qualifying Interests have been considered as appropriate along the full extent of the SAC e.g. otter commuting habitat in Lough Cullin c. 54km downstream of the project site (APEM Group Woodrow, 2026). The River Moy SAC also is designated for Salmonid Waters.

Hydrogeological connectivity with designated sites has been defined in **Chapter 7** (Water) and has informed this Chapter.

National Sites

In Ireland, National Heritage Areas (NHAs) are designated under the Wildlife Amendment Act (2000) as areas considered important for the habitats present or areas which support plants and animals whose habitat needs protection. Proposed National Heritage Areas (pNHAs) are recognised on a non-statutory basis but have not been statutorily proposed or designated. They are of ecological value for their habitats or species.

The project has been identified as having potential for likely significant effects on the following NHAs:-

- Bella Bridge Bog [000591];
- Cornaveagh Bog [000603]; and,
- Tullaghan Bog [001652].

Nine pNHAs were identified as having potential for likely significant effects as a result of the project:-

- Derrynabrock Bog [000457];
- Feenagh and Bunnamuck Loughs [001905];
- Gowlaun Bog [000502];
- Kilgarraff Bog [000510];
- Lough Gara [000587];
- Lough Glinn [001644];
- Moylough Turlough [001677];
- Quarryfield West Turlough [001901]; and,
- Tullaghanrock Bog [002013].

As above for Natura 2000 sites, connectivity between the project site and a designated site can occur over land, through hydrological or hydrogeological connectivity, or through mobile species using lands outside of the NHAs and pNHAs.

Hydrological and hydrogeological connectivity with designated sites has been defined in **Chapter 7** (Water) and has informed this Chapter.

5.3.2.2 Desk Study Results for Bats

The desk study revealed a total of 7 no. bat species were recorded within 10km of the central location within the project site from a total of 88 historical bat records provided by Bat Conservation Ireland (BCI). Error! Reference source not found. **Table 12** shows bat species recorded in roosts, transect and *ad hoc* surveys within the 10km search radius in addition to Lundy *et al.* (2011) individual species' habitat suitability index and level scores (NBDC, 2023).

Species	Roost records within 10km?	Transect/ <i>ad hoc</i> records within 10 km?	Habitat Directive	Irish Red List Status	NBDC habitat suitability
Common pipistrelle (<i>Pipistrellus pipistrellus</i>)	Yes	Yes	Annex IV	Least Concern	26 Moderate
Soprano pipistrelle (<i>Pipistrellus pygmaeus</i>)	Yes	Yes	Annex IV	Least Concern	31 High
Leisler's bat (<i>Nyctalus leisleri</i>)	No	Yes	Annex IV	Least Concern	24 Moderate
Brown long-eared bat (<i>Plecotus auritus</i>)	Yes	Yes	Annex IV	Least Concern	21 Moderate
Whiskered bat (<i>Myotis mystacinus</i>)	Yes	No	Annex IV	Least Concern	8 Low

Species	Roost records within 10km?	Transect/ad hoc records within 10 km?	Habitat Directive	Irish Red List Status	NBDC habitat suitability
Daubenton's bat (<i>Myotis daubentonii</i>)	Yes	Yes	Annex IV	Least Concern	19 Low
Natterer's bat (<i>Myotis nattereri</i>)	No	Yes	Annex IV	Least Concern	17 Low
Nathusius' pipistrelle (<i>Pipistrellus nathusii</i>)	No	No	Annex IV	Least Concern	4 Very Low
Lesser horseshoe bat (<i>Rhinolophus hipposideros</i>)	No	No	Annex IV	Least Concern	0 Very Low

Table 12: Bat species records within 10km search radius with information on species conservation status and NBDC habitat suitability index.

5.3.3 Field Study Results

In specific cases, the area surveyed was extended beyond the project site boundary to ensure adherence to best practice guidance for the respective ecological disciplines (**Table 13**) **Error! Reference source not found.**

Survey	Lands Surveyed	References
Habitats & Flora	Lands within the project site, including turbine component haul route.	CIEEM, 2024; Fossitt 2000
Badger	Lands within the project site plus an additional 150m from pilling or blasting, etc.	NRA 2006; NRA 2009b
Otter	Lands within the project site plus an additional 150m upstream and downstream of all watercourse crossing points, including the underground electricity line route.	NRA 2008; NRA 2009b
Bats	Lands within the project site plus a buffer of 300m from the turbine locations for roost, and habitat assessment on a precautionary basis.	Nature Scot 2021; Collins (2023).
Birds	Lands within the project site plus a buffer of 500m around turbines and a wider survey area (c. 2km for breeding raptor/hen harrier roost surveys and c. 5km for wintering waterbird surveys in wider area).	SNH (now NatureScot) 2017. Post survey this was updated in 2025 after surveys concluded.

Aquatics	Viable watercourses in receipt of surface run-off from the project site. Upstream (control) and downstream Q-value assessments of the project site outfall. Downstream assessments for crayfish and fish habitat. Salmon/lamprey suitability surveys (River Hydromorphology Assessment Techniques – RHAT).	NRA 2009b; Peay 2003; Gammell <i>et al.</i> 2021; Hendry & Cragg-Hine 1997; JNCC 2015; Maitland 2003
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Table 13: Best practice guidance on ecological surveys.

5.3.3.1 Habitat Field Study Results

All habitats identified within the project site are described in **Annex 5.2**. The following sections, using the standard classification codes as per Fossitt (2000), describe habitats that have been valued as Local (Higher) ecological importance and above. For those habitats valued as Local (Lower) ecological importance, which have limited ecological importance, including BL3 buildings and artificial surfaces, see **Annex 5.2** for full habitat descriptions. The habitats within the project site are summarised in ***Please note**: this is secondary woodland alongside an existing road and does not qualify as EU Annex I bog woodland (91D0)', which refers to woodland of intact raised bog, examples of this priority habitat are very rare in Ireland.

Table 14: Overview of habitats within the study area and evaluation of ecological features

Table 14.

Habitat (Fossitt 2000)	EU Annex I Habitat Type Affiliations	Area/ Length (ha/km)	Ecological Valuation	Important Ecological Feature (IEF)?
(BL3) Buildings and artificial surfaces	N/A	3.27ha	Local (lower)	No
(ED2) Spoil and bare ground	N/A	0.06ha	Local (lower)	No
(FW4) Drainage ditch	N/A	14.99km	Local (higher)	Yes
(GA1) Improved grassland	N/A	0.17ha	Local (lower)	No
(GS3) Dry-humid acid grassland	N/A	4.10ha	Local (lower)	No
(GS4) Wet grassland	N/A	3.67ha	Local (lower)	No
(PB2) Upland blanket bog	7130* Blanket bog (active), 7130 Blanket bog, 7150 Depressions on peat substrates of the <i>Rhynchosporion</i>	74.09ha	National/ County	Yes
(PB4) Cutover bog	7130* Blanket bog (active), 7130 Blanket bog, 4010 Northern Atlantic wet heaths with <i>Erica tetralix</i> ,	45.53ha	County/ Local (higher)	Yes

Habitat (Fossitt 2000)	EU Annex I Habitat Type Affiliations	Area/ Length (ha/km)	Ecological Valuation	Important Ecological Feature (IEF)?
	7150 Depressions on peat substrates of the <i>Rhynchosporion</i>			
(WD4) Conifer plantation	N/A	22.26ha	Local (lower)	No
(WL1) Hedgerows	N/A	1.71km	Local (higher)	Yes
(WL2) Treelines	N/A	0.13km	Local (higher)	Yes
(WN7) Bog woodland*	N/A	0.01ha	Local (higher)	Yes
(WS1) Scrub	N/A	4.34ha	Local (higher)	Yes

***Please note:** this is secondary woodland alongside an existing road and does not qualify as EU Annex I bog woodland (91D0)', which refers to woodland of intact raised bog, examples of this priority habitat are very rare in Ireland.

Table 14: Overview of habitats within the study area and evaluation of ecological features

(FW4) Drainage Ditches

(FW4) Drainage ditches are widespread across the project site, ranging in size and scale. The (FW4) Drainage ditches within the (PB4) Cutover bog where active peat extraction is on-going are of an industrial scale often measuring c. 2m wide and 3m deep. Elsewhere within the project site where the (FW4) Drainage ditches are located within historic (PB4) Cutover bog, they are more modest in size (c. 1m width and c. 1m depth) (**Plate 1**). These (FW4) Drainage ditches often form the boundaries of land parcels. These boundaries are largely unmanaged and as such are frequently associated with low invading (WS1) Scrub and derelict (WL1) Hedgerows. (FW4) Drainage ditches were also recorded within the (PB2) Upland blanket bog habitat where a drying effect was often evident. These wet ditches are largely unvegetated by aquatic species, although one record of Lesser bladderwort (*Utricularia minor*) was recorded within a large artificial drain (c. 10m wide and 2m deep) near T09 (**Table 15**)
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Plate 1: (FW4) Drainage ditch near T09

Scientific Name	Common Name	DAFOR
<i>Angelica sylvestris</i>	Wild angelica	O
<i>Arrhenatherum elatius</i>	False oat-grass	O
<i>Calluna vulgaris</i>	Heather	F
<i>Dryopteris dilatata</i>	Broad buckler-fern	O
<i>Eriophorum vaginatum</i>	Hare's-tail cottongrass	O
<i>Eriophorum angustifolium</i>	Common cotton-grass	F
<i>Glyceria fluitans</i>	Floating sweet-grass	R
<i>Holcus lanatus</i>	Yorkshire-fog	F
<i>Juncus bulbosus</i>	Bulbous rush	O
<i>Juncus effusus</i>	Soft-rush	F
<i>Molinia caerulea</i>	Purple moor-grass	F
<i>Polytrichum commune</i>	Common haircap	O
<i>Rubus fruticosus</i> agg.	Bramble	F
<i>Salix cinerea</i>	Grey willow	O
<i>Utricularia minor</i>	Lesser bladderwort	R

Table 15: Species list for (FW4) Drainage ditches

(PB2) Upland Blanket Bog

The classification of this habitat as (PB2) Upland Blanket Bog is the most appropriate for this habitat for several reasons. First, the elevation of the project site ranges

between approximately 140m and 170m. This places the majority of the project site above the 150m threshold, below which is the typical range for (PB3) Lowland Blanket Bog (Fossitt 2000). Deep peat is found across the project site, with depths ranging from 0 to 7.2 metres. However, for (PB2) Upland Blanket Bogs “peat depths vary and normally fall within the range of 1-2m but can be much deeper in pockets”, as is the case at the project site (Fossitt 2000, p. 46). Moreover, peatland systems which may have originally begun as raised bogs can merge into “a general expanse of blanket bog, losing their distinctive marginal features” (European Commission 2013, p. 84). This is likely the case here, with the flatter expanses of bog having accumulated deeper peat and formed an intermediate type between a blanket bog and a raised bog with characteristics of both presenting themselves (Lindsay 1995, pp. 53). Despite these intermediate features, the hydrology of the peatlands is most consistent with that of a blanket bog, further reinforcing the (PB2) Upland blanket bog classification.

Additionally, the nearest mapped peatland, located 1.5km east of T3 at an elevation between 140-150m, is classified as Annex I ‘7130 Blanket Bog’ by the National Parks and Wildlife Service (NPWS), aligning closely with the project site’s elevation range. While there are raised bogs in the surrounding landscape, these are generally found at much lower elevations (below 100m), which corresponds to the typical range for (PB1) Raised Bogs. Thus, the combination of elevation, peat depth, hydrology, and surrounding landscape context all point to (PB2) Upland Blanket Bog as the most accurate habitat classification for this site.

Bogs which have an “uninterrupted history of natural growth” are termed primary bogs (SNH 1995, pp. 69). The (PB2) Upland blanket bog identified within the project site is an example of primary bog. Secondary bog is an alternative term used to describe cutover bog (SNH 1995, pp. 69). This distinction can be useful when assessing the ecological value of these habitats.

The (PB2) Upland blanket bog identified across the project site is generally in good condition with a relatively high species diversity and active bryophyte layer. No hummock-hollow microtopography was identified (**Plate 2**). This is likely a result of impaired hydrological function following many decades of turf extraction.

The (PB2) Upland blanket bog located between T01-T04 has been negatively impacted by forestry practices, including afforestation and the excavation of drainage channels. This area has also been negatively impacted by wildfire, with damage to the bryophyte layer noted (**Annex 5.2: Appendix I, T01i**).

The (PB2) Upland blanket bog between T05 and T06 is intact primary bog with heather (*Calluna vulgaris*) dominating the dwarf shrub layer, cottongrasses (*Eriophorum* spp.) contributing to the graminoid layer, and a bryophyte layer dominated by red bog-moss (*Sphagnum rubellum*) (T06i). The (PB2) Upland blanket bog to the south of T08 is threatened by active turf cutting and associated drainage activities. The remaining (PB2) Upland peatland in the local vicinity of T08 retains an active bryophyte layer and good species diversity. However, a drying effect associated with the drainage channels and turf extraction was noted with a reduction in the cover of bog-mosses (*Sphagnum* spp.) (**Annex 5.2, Appendix I, T08ii**). The (PB2) Upland blanket bog to the north of T10 has been impacted by turf cutting activities and the drying effect is having a notable influence on the bryophyte layer, with bog-mosses becoming less abundant and the lichen *Cladonia portentosa* becoming more prominent (**Annex**

5.2, Appendix I, T10i). A species list for this habitat is provided (Table 16: Species list for (PB2) Upland blanket bog **Table 16**).



Plate 2: Primary, Intact (PB2) Upland blanket bog between T05 and T06

Scientific Name	Common Name	DAFOR
<i>Aulacomnium palustre</i>	Bog Bead-moss	O
<i>Calluna vulgaris</i>	Heather	A
<i>Campylopus introflexus</i>	Heath star-moss	O
<i>Carex panicea</i>	Carnation sedge	F
<i>Cladonia portentosa</i>	Reindeer lichen	F
<i>Cladonia uncialis</i>	Thorn-cup lichen	R
<i>Dicranum scoparium</i>	Broom fork-moss	O
<i>Diplophyllum albicans</i>	White earwort	O
<i>Drosera intermedia</i>	Oblong-leaved sundew	O
<i>Drosera rotundifolia</i>	Round-leaved sundew	O
<i>Erica tetralix</i>	Cross-leaved heath	F
<i>Eriophorum angustifolium</i>	Common cotton-grass	F
<i>Eriophorum vaginatum</i>	Hare's-tail cottongrass	F
<i>Galium saxatile</i>	Heath bedstraw	R
<i>Hypnum jutlandicum</i>	Heath plait-moss	O

<i>Leucobryum glaucum</i>	Pincushion moss	R
<i>Melampyrum pratense</i>	Common cow-wheat	R
<i>Menyanthes trifoliata</i>	Bogbean	R
<i>Molinia caerulea</i>	Purple moor-grass	F
<i>Myrica gale</i>	Bog myrtle	O
<i>Narthecium ossifragum</i>	Bog asphodel	F
<i>Odontoschisma sphagni</i>	Bog-moss flapwort	O
<i>Pedicularis sylvatica</i>	Common lousewort	O
<i>Pleurozium schreberi</i>	Red-stemmed feather-moss	O
<i>Polygala serpyllifolia</i>	Heath milkwort	R
<i>Potentilla erecta</i>	Tormentil	F
<i>Pseudoscleropodium purum</i>	Neat feather-moss	R
<i>Racomitrium lanuginosum</i>	Woolly Fringe-moss	R
<i>Rhynchospora alba</i>	White beak-sedge	O
<i>Rhynchospora fusca</i>	Brown beak-sedge	R
<i>Sphagnum cuspidatum</i>	Feathery bog-moss	O
<i>Sphagnum denticulatum</i>	Cow-horn bog-moss	O
<i>Sphagnum fallax</i>	Flat-topped bog-moss	R
<i>Sphagnum palustre</i>	Blunt-leaved bog-moss	R
<i>Sphagnum papillosum</i>	Papillose bog-moss	O
<i>Sphagnum rubellum</i>	Red bog-moss	A
<i>Sphagnum subnitens</i>	Lustrous Bog-moss	R
<i>Sphagnum tenellum</i>	Soft bog-moss	O
<i>Succisa pratensis</i>	Devil's-bit scabious	L A
<i>Trichophorum germanicum</i>	Deergrass	F
<i>Vaccinium oxycoccos</i>	Cranberry	O

Table 16: Species list for (PB2) Upland blanket bog

(PB4) Cutover bog

(PB4) Cutover bog is a highly variable habitat which can range from predominantly bare peat to re-vegetated active peatland (**Plate 3**). Indeed, examples of both are found within the project site. (PB4) Cutover which has recently been excavated and disturbed will likely have a significant coverage of bare peat accompanied by pioneer species such as common cotton-grass (*Eriophorum angustifolium*), heath star-moss (*Campylopus introflexus*), and bulbous rush (*Juncus bulbosus*) (**Annex 5.2, Appendix I, T09ii**). However, even on disturbed bare peat, remnant species indicative

of high-quality conditions can persist such as round-leaved sundew (*Drosera rotundifolia*) and papillose bog-moss (*Sphagnum papillosum*) (**Annex 5.2, Appendix I, T09ii**). Indeed, this describes the habitat in the local vicinity of T09, where large-scale mechanical excavation of peat is on-going.

In contrast then, historic cutover can be fully re-vegetated with a high diversity of peatland species and a rich bryophyte layer including high bog-moss coverage. This is the case at T01 where the bryophyte layer is locally dominated by papillose bog-moss, with red bog-moss, and cow-horn bog-moss (*Sphagnum denticulatum*) also present (**Annex 5.2, Appendix I, T01v**). At times, the peat can still feel firm underfoot alluding to past removal of the acrotelm. Peat hags and drainage ditches are often reliable markers for delineating (PB4) Cutover bog from primary bog.

Due to the variability in vegetative composition within the (PB4) Cutover bog category the ecological value assigned to this habitat must reflect this. While collecting quadrat data, notes were taken on the substrate so that a distinction could be made between (PB4) Cutover bog which is composed of active deep peat and (PB4) Cutover bog which is inactive. A species list for this habitat is provided at **Table 17**.



Plate 3: Secondary, (PB4) Cutover blanket bog between T09

Scientific Name	Common Name	DAFOR
<i>Agrostis canina</i>	Velvet bent	O
<i>Anthoxanthum odoratum</i>	Sweet vernal-grass	O
<i>Aulacomnium palustre</i>	Bog Bead-moss	R
<i>Betula pubescens</i>	Downy birch	F
<i>Blechnum spicant</i>	Hard fern	R

<i>Calluna vulgaris</i>	Heather	A
<i>Campylopus introflexus</i>	Heath star-moss	O
<i>Carex flacca</i>	Glaucous sedge	O
<i>Carex leporina</i>	Oval sedge	R
<i>Carex nigra</i>	Common sedge	O
<i>Carex panicea</i>	Carnation sedge	F
<i>Carex rostrata</i>	Bottle sedge	R
<i>Cladonia portentosa</i>	Reindeer lichen	O
<i>Cynosurus cristatus</i>	Crested dog's-tail	R
<i>Dactylis glomerata</i>	Cock's-foot	O
<i>Drosera rotundifolia</i>	Round-leaved sundew	O
<i>Dryopteris dilatata</i>	Broad buckler-fern	R
<i>Erica tetralix</i>	Cross-leaved heath	O
<i>Eriophorum angustifolium</i>	Common cotton-grass	L D
<i>Eriophorum vaginatum</i>	Hare's-tail cottongrass	O
<i>Hylocomium splendens</i>	Glittering wood-moss	O
<i>Hypnum jutlandicum</i>	Heath plait-moss	F
<i>Hypochaeris radicata</i>	Cat's-ear	O
<i>Juncus bulbosus</i>	Bulbous rush	O
<i>Juncus effusus</i>	Soft-rush	O
<i>Melampyrum pratense</i>	Common cow-wheat	R
<i>Molinia caerulea</i>	Purple moor-grass	L D
<i>Myrica gale</i>	Bog myrtle	F
<i>Narthecium ossifragum</i>	Bog asphodel	O
<i>Odontoschisma sphagni</i>	Bog-moss flapwort	O
<i>Pleurozium schreberi</i>	Red-stemmed feather-moss	O
<i>Polygala serpyllifolia</i>	Heath milkwort	R
<i>Polytrichum commune</i>	Common haircap	F
<i>Potentilla erecta</i>	Tormentil	F
<i>Potentilla anserina</i>	Silverweed	R
<i>Rhytidiadelphus squarrosus</i>	Springy turf-moss	O
<i>Rubus fruticosus</i> agg.	Bramble	F
<i>Salix cinerea</i>	Grey willow	O

<i>Sphagnum denticulatum</i>	Cow-horn bog-moss	O
<i>Sphagnum fallax</i>	Flat-topped bog-moss	O
<i>Sphagnum palustre</i>	Blunt-leaved bog-moss	O
<i>Sphagnum papillosum</i>	Papillose bog-moss	O
<i>Sphagnum rubellum</i>	Red bog-moss	A
<i>Sphagnum tenellum</i>	Soft bog-moss	O
<i>Succisa pratensis</i>	Devil's-bit scabious	L A
<i>Thuidium tamariscinum</i>	Common tamarisk-moss	O
<i>Trichophorum germanicum</i>	Deergrass	O

Table 17: Species list for (PB4) Cutover bog

(WL1) Hedgerows

(WL1) Hedgerows are not a prominent feature across the project site, although they can be found bordering the network of unnamed roads and lesser roads within the project site (**Plate 4**). The hedgerows are dominated by shrubs and climbers, with a small margin (c. 30cm) for herbaceous species (**Table 18**).



Plate 4: (WL1) Hedgerow to the south of T10

Scientific Name	Common Name	DAFOR
<i>Anthoxanthum odoratum</i>	Sweet vernal-grass	O
<i>Arrhenatherum elatius</i>	False oat grass	O

<i>Betula pubescens</i>	Downy birch	F
<i>Centaurea nigra</i>	Common knapweed	O
<i>Corylus avellana</i>	Hazel	L A
<i>Crataegus monogyna</i>	Hawthorn	A
<i>Cynosurus cristatus</i>	Crested dog's-tail	O
<i>Daucus carota</i>	Wild carrot	O
<i>Galium aparine</i>	Cleavers	F
<i>Hedera hibernica</i>	Atlantic ivy	F
<i>Heracleum sphondylium</i>	Common hogweed	O
<i>Holcus lanatus</i>	Yorkshire-fog	F
<i>Ilex aquifolium</i>	Holly	F
<i>Ligustrum vulgare</i>	Common privet	O
<i>Lolium perenne</i>	Perennial ryegrass	F
<i>Lonicera periclymenum</i>	Honeysuckle	O
<i>Picea sitchensis</i>	Sitka spruce	O
<i>Poa trivialis</i>	Rough-stalked meadow-grass	O
<i>Pteridium aquilinum</i>	Bracken	F
<i>Ranunculus acris</i>	Meadow buttercup	R
<i>Ranunculus repens</i>	Creeping buttercup	O
<i>Rubus fruticosus</i> agg.	Bramble	F
<i>Salix cinerea</i>	Grey willow	F
<i>Trifolium pratense</i>	Red clover	O
<i>Ulex europaeus</i>	European gorse	O
<i>Urtica dioica</i>	Common nettle	F
<i>Vicia sativa</i>	Common vetch	O

Table 18: Species list for (WL1) Hedgerows

(WL2) Treeline

A single (WL2) Treeline was identified to the south-east of the compound at T06. The (WL2) Treeline is composed of semi-mature broadleaved trees which border a small land parcel and house (**Plate 5**). A species list for this habitat is provided at **Table** .



Plate 5: (WL2) Treeline to south-east of T06

Scientific Name	Common Name	DAFOR
<i>Alnus glutinosa</i>	Alder	A
<i>Fraxinus excelsior</i>	Ash	F
<i>Hedera hibernica</i>	Atlantic ivy	F
<i>Juncus effusus</i>	Soft-rush	O
<i>Rubus fruticosus</i> agg.	Bramble	F
<i>Salix cinerea</i>	Grey willow	F

Table 19: Species list for (WL2) Treeline

(WN7) Bog woodland

A parcel of (WN7) Bog woodland has developed on historic cutover along the unnamed road to the south of T10 (**Plate 6**). The stand is dominated by immature downy birch (*Betula pubescens*; Table). The trees reach the 5m threshold for woodland parcels, however there are no mature trees in the stand. The trees form a distinct canopy, although this is somewhat open. The stand is heavily infested with the invasive alien species, cherry laurel (*Prunus laurocerasus*). No bog-moss species were noted, and the habitat is not peat forming. As this habitat is not located on intact raised bog, then this habitat is not considered to qualify as Annex I habitat type 91D0 Bog woodland.



Plate 6: (WN7) Bog woodland along Turbine Delivery Route

Scientific Name	Common Name	DAFOR
<i>Betula pubescens</i>	Downy birch	A
<i>Pteridium aquilinum</i>	Bracken	O
<i>Rubus fruticosus</i> agg.	Bramble	A
<i>Salix cinerea</i>	Grey willow	O
<i>Thuidium tamariscinum</i>	Common tamarisk-moss	F
<i>Ulex europaeus</i>	European gorse	F

Table 20: Species list for (WN7) Bog woodland

(WS1) Scrub

Pockets of (WS1) Scrub can be found throughout the (PB4) Cutover bog habitat (**Plate 7**). Small parcels (<400 m²) of (WS1) Scrub were not mapped. The dominant species associated with (WS1) Scrub habitat are variable and often include willow (*Salix* spp.), common gorse (*Ulex europaeus*), and bramble (*Rubus fruticosus* agg.) (**Table 21**).



Plate 7: (WS1) Scrub

Scientific Name	Common Name	DAFOR
<i>Betula pubescens</i>	Downy birch	O
<i>Corylus avellana</i>	Hazel	R
<i>Ilex aquifolium</i>	Holly	O
<i>Juncus effusus</i>	Soft-rush	O
<i>Molinia caerulea</i>	Purple moor-grass	A
<i>Myrica gale</i>	Bog myrtle	R
<i>Pseudoscleropodium purum</i>	Neat feather-moss	O
<i>Pteridium aquilinum</i>	Bracken	F
<i>Rubus fruticosus</i> agg.	Bramble	A
<i>Salix cinerea</i>	Grey willow	O
<i>Thuidium tamariscinum</i>	Common tamarisk-moss	F
<i>Ulex europaeus</i>	European gorse	F

Table 21: Species List for (WS1) Scrub

Annex I Habitat Field Study Results

The Fossitt (2000) habitat type (PB2) Upland blanket bog corresponds with the following Annex I habitat types:-

- 7130* Blanket bog (active); and,

- 7150 Depressions on peat substrates of the *Rhynchosporion*.

The Fossitt (2000) habitat type (PB4) Cutover bog has potential affinity with the following Annex I habitat types:

- 7130* Blanket bog (active);
- 7130 Blanket bog (inactive); and,
- 4010 Northern Atlantic wet heaths with *Erica tetralix*.

It is important to note that while these habitats correspond with Annex I habitat types, these falls outside of the Natura 2000 network. Therefore, the specific extent of these habitats within the project site are not protected under the EU Habitats Directive. Only the areas that could potentially be impacted by construction were assessed against Annex I monitoring criteria. For (PB2) Blanket bog 51.42ha (c. 69% of mapped extent) was surveyed, while for (PB4) Cutover bog 41.23ha (c. 91% of mapped extent).

Where the area within the immediate vicinity (c. 100m) of a monitoring stop fails the Annex I assessment criteria, then the habitat is still considered to qualify as Annex I habitat albeit in a degraded or unfavourable condition.

The Annex I habitat types have been assessed here as of either of *National importance*, *County importance* or *Local (higher) importance* based on the best practice guidance for establishing ecological value (NRA, 2009:15). The data gathered during the monitoring stops have also informed this determination by assessing the condition of the '*structure and function*' of the habitat and relating this to the definition of a '*viable area*' (Perrin et al. 2010:23, NRA 2009:16).

Where the Annex I habitat constitutes a viable area, meaning the habitat is resilient to stochastic events, then the habitat is assessed as of *National importance* (NRA, 2009, pp. 16). This corresponds with areas of active (PB2) Upland blanket bog, which pass the assessment criteria for Annex I habitat type 7130* Blanket bog (active).

Where the Annex I habitat type does not meet the criteria for 'viable' area, for example where several threats or pressures have been recorded as negatively impacting the integrity of the habitat, then the habitat has been assessed as of *County importance*. This corresponds to areas of active/inactive (PB2) Upland blanket bog as well as active (PB4) Cutover bog, which fail the assessment for Annex I habitat type 7130* Blanket bog.

Careful consideration was given to downgrading the areas of inactive (PB2) Upland blanket bog and active (PB4) Cutover bog, which fail the assessment criteria to Local (higher) importance as the carbon storage potential of these habitats ranges from temporarily limited to irreversibly lost. However, these habitats still meet the stated criteria for ecological valuation listed under *County importance*, including:-

- 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; and,
- Site containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.

Furthermore, best practice guidance on assessing the geographic valuation of IEFs states:-

- “It is essential not to under-estimate the importance of habitats in sub-optimal condition where there is potential for restoration. For example, degraded peatlands are still capable of supporting indicator species and features of near-natural priority peatland” (CIEEM, 2024:32).

The Annex I habitat type 7150 Depressions on peat substrates of the *Rhynchosporion* was identified within the (PB2) Upland blanket bog. *Rhynchospora alba* hollows were also identified within the active (PB4) Cutover bog. However, *Rhynchospora alba* hollows are only considered an EU Annex I habitat type when they occur on “the most sensitive and less disturbed parts” of a bog in an Irish context (NPWS, 2019: 830). Therefore, *Rhynchospora alba* hollows identified within (PB4) Cutover bog were not identified as Annex I habitat type 7150 Depressions on peat substrates of the *Rhynchosporion*.

No Annex I assessments were carried out for Annex I habitat type 7150 Depressions on peat substrates of the *Rhynchosporion* as this habitat type is “considered to be an integral part and microhabitat” of good quality Annex I habitat type 7130* Blanket bog (active) (NPWS, 2019, pp. 830). The extent of the *Rhynchospora alba* hollows within the project site is limited to discrete c. 2m x 2m areas and due to the limited extent of this habitat, it is classified as of *County importance* in this instance.

Areas of (PB4) Cutover bog where the peat depth is <0.5m have been identified as Annex I habitat type 4010 Northern Atlantic wet heaths with *Erica tetralix*. These areas were limited in extent and each failed the associated monitoring stop due to the identified threats to integrity of the habitat.

Areas of inactive (PB4) Cutover bog which fail the assessment criteria for Annex I habitat type 7130 Blanket bog (inactive) and 4010 Northern Atlantic wet heaths with *Erica tetralix*, which fail the associated monitoring stop have been classified as Local (higher) importance, as they meet the criteria for this ecological valuation, namely:-

- 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; and,
- 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.

The overall conservation status of Annex I 7130* Blanket bog across the project site is assessed as *Unfavourable Bad*. This result is based on several factors:-

- There is a >1% decrease in surface area across the project site;
- 39/52 of the monitoring stops fail the assessment, including:-
 - 43% of the monitoring stops for (PB2) Upland blanket bog;
 - 19% of the monitoring stops for (PB4) Cutover bog; and,
 - 100% of the monitoring stops located on (HH3) Wet heaths.
- The future prospects are *Unfavourable Bad* as a result of on-going threats to the integrity of Annex I habitat types including:-
 - Peat extraction and associated drainage;
 - Invasive alien species (other than species of Union concern);

- Forestry and drainage for forestry; and,
- Natural wildfire.

A summary of these classifications and categorisations is provided in **Table 18**.

Annex I Code & Habitat	Monitoring Stop	Fossitt 2000 Category	Ecological Valuation	Area (ha)	Monitoring Stops
7130* Blanket bog (active)	Pass	(PB2) Upland blanket bog (active)	National	26.8	7
7130* Blanket bog (active)	Fail	(PB2) Upland blanket bog (active)	County	22.9	8
7130 Blanket bog (inactive)	Fail	(PB2) Upland blanket bog (inactive)	County	1.7	1
7130* Blanket bog (active)	Pass/Fail	(PB4) Cutover bog (active)	County	26.1	16
7130 Blanket bog (inactive)	Fail	(PB4) Cutover bog (inactive)	Local (high)	14.5	12
4010 Northern Atlantic wet heaths with <i>Erica tetralix</i>	Fail	(PB4) Cutover bog (inactive)	Local (high)	0.6	4
7150 Depressions on peat substrates of the Rhynchosporion	N/A	(PB2) Upland blanket bog (active)/ (PB4) Cutover bog (active)	County	< 0.5	0

Table 18: Annex I habitat types identified at the project site and corresponding Fossitt 2000 categories and the estimated coverage.

Three additional monitoring stops (T02v, T03i, T07v) were located within non-peatland habitats namely (WD4) Conifer plantation and (GS4) Wet grassland. These habitats are likely to have previously been (PB2) Upland blanket bog corresponding to the Annex I habitat type 7130* Blanket bog (active). Quadrat data and monitoring stops for Annex I assessments were conducted at these locations to provide a complete data set across the project site, following best practice guidance (Perrin *et al.* 2014: 47). Each of these monitoring stops failed assessment criteria for Annex I habitat type 7130* Blanket bog.

5.3.3.2 Invasive Alien Species Field Study Results

During botanical survey work, several invasive alien species were identified and target noted across the project site. Detailed survey results can be found in **Annex 5.2**.

Two Invasive Alien Species which were identified within the project site are listed in the Third Schedule of the European Communities ('Birds and Natural Habitats') Regulations 2011 (S.I. No. 477/2011 (as amended)). Regulations 49 and 50 prohibit the introduction and spread of the species listed on the Third Schedule.

One stand of Japanese knotweed (*Reynoutria japonica* (syn. *Fallopia japonica*)) was identified along the lesser road (L-5501), where road widening works are proposed for the Turbine Delivery Route. The stand is approximately 1m in width and 5m in length and is located along the boundary wall beside an access gate to an agricultural field.

Five stands of rhododendron (*Rhododendron ponticum*) were identified across the project site. Two small stands (c. 5m x 2m) are located in close proximity to T10. One of these (E561754 N 797362) is located within the footprint of the proposed access

track to T10. The other (E 561788 N797402) is located c. 12.5m to the north-west of the access track. A large stand (c. 20m x 20m) is located to c. 20m the west of the hardstand for T3 (E562631 N800178). Another large stand (c. 20m x 20m) is located in the (WD4) Commercial forestry to the west of the lesser road (L-5501) and the proposed road widening works along the Turbine Delivery Route. Finally, one small shrub (c. 1m x 1m) is located on the (PB2) Upland blanket bog between T5 and T6 (E561526 N799427).

Other non-scheduled invasive species found onsite include cherry-laurel (*Prunus laurocerasus*), semi-mature sycamore (*Acer pseudoplatanus*), montbretia (*Crocasmia x crocosmiiflora*), red osier dogwood (*Cornus sericea*), snowberry (*Symphoricarpos albus*), fuschia (*Fuchsia magellanica*), Wilson's honeysuckle (*Lonicera nitida*) and white-clawed crayfish (See NIS, Woodrow, 2026).

Best practice guidance on the control of Invasive Alien Species is publicly available (TII 2020). It is advisable to engage a qualified Registered Pesticide Advisor with appropriate training, experience, and expertise in managing invasive alien species to support the planning and implementation of control measures for these Invasive Species.

5.3.3.3 Terrestrial (non-volant) Mammals Field Study Results

A map showing the project in relation to the location of resting places for protected mammal species (considered as important ecological features) is provided in **Annex 5.5**. Several native species of mammals afforded protection under Section 23 of the Wildlife Act (1976) as amended 2000 and listed on the Fifth Schedule were recorded within the project site, including otter (*Lutra lutra*), badger (*Meles meles*), and pine marten (*Martes martes*). Otter is also listed in Annex II of the Habitats Directive and there is a downstream SAC (River Moy SAC), where otter is listed as a Qualifying Interest (QI). Potential evidence of red squirrel (*Sciurus vulgaris*) via feeding signs was also recorded within the project site.

The following sections provide species accounts for these four mammals; and otter, badger and pine marten were considered important ecological features occurring within or adjacent to the project site and are carried through for further assessment.

Other protected mammal species not recorded that have the potential to occur include Irish stoat (*Mustela erminea hibernica*), pygmy shrew (*Sorex minutus*), Irish hare (*Lepus timidus hibernicus*) and hedgehog (*Erinaceus europaeus*).

Foxes (*Vulpes vulpes*) were common throughout the area. These species are not listed as protected mammals on the Fifth Schedule.

The area was considered suitable for non-native mammal species, including mink (*Neovision vision*) which have been recorded in the wider area (**Annex 5.1**).

There were no NBDC records of red squirrel within the eight 2km grid squares in which the project site is located. There is one record within 10km grid square M69 – this record was from Monasterreden on the shores of Lough Gara in 2001 (Carey *et al.* 2007).

Badger

Four badger setts were identified across the project site and within the 150m buffer zone beyond the site boundary which was surveyed in accordance with best practice. Of the four setts, two were identified as active setts and two were

considered to be inactive setts during the surveys. Full details regarding sett locations is available in **Annex 5.5**.

The first sett, (Sett 1), was identified at the edge of a treeline, approximately 90 m from the project. This sett has one entrance and in March 2025 appeared to be inactive, with leaf litter collecting at the entrance.

The second sett, (Sett 2), was located approximately 15m from the project. This sett is considered to be an annex sett with at least 2 entrances. The sett was identified in a mound of large boulders in a treeline of ash (*Fraxinus excelsior*), willow, hazel (*Corylus avellana*) and sycamore (*Acer pseudoplatanus*). The agricultural habitat and network of treelines and hedgerows in the area surrounding the sett provides good quality habitat for badger. Examination of the entrance showed it to be very well used, with much bare ground in the surrounding area. There was some mounding of earth showing previous excavation and some fresh scratch marks were observed in the vicinity. A trail camera was deployed on 06 March 2025. At least two badgers were observed using the sett entrance on numerous occasions during the deployment. The badgers were observed mating at the sett entrance. This sett is considered to be an active annex sett.

The third sett, (Sett 3), was identified approximately 5m from the project. The sett had two entrances with an active sett entrance located on the bank of peat under a treeline of birch (*Betula* spp.). A latrine was observed approximately 1m from the active sett entrance. A trail camera was deployed on 06 March 2025, and one badger was observed using the sett throughout deployment. Judging from the size of this sett which has one apparent active entrance (and one inactive entrance), it is concluded that this is an active outlier badger sett, in accordance with the characteristics summarised in **Table 9** in the mammal baseline report (**Annex 5.4**).

The largest badger sett, (Sett 4), was recorded approximately 45m from the proposed underground electricity line. The sett is located along a watercourse (Lung River) within a treeline comprising mainly of ash, willow, birch and horse chestnut (*Aesculus hippocastanum*). Examinations of the entrances showed bare ground in the surrounding area and little accumulated litter (for example, leaves and sticks) in the entrances. Other signs of mammal activity, such as trails were observed in the general vicinity of this sett. A trail camera was deployed on 27 March 2025, and no badgers were observed using the sett. Upon retrieval of the camera in May, it was apparent that vegetation had overgrown the sett area and no evidence of badger activity was observed. Judging from the size of this sett which has at least seven entrances, as well as the lack of activity recorded at this location during the trail camera deployment, it is concluded that this is an inactive main badger sett.

Otter

Field surveys of the project site (and 150m buffer zone beyond the site boundary which was surveyed in accordance with best practice) yielded occasional signs of otter activity, with field signs located on the Owengarve River in the vicinity of turbine T1 and turbine T6. Recorded field signs indicative of otter activity including spraint, trails, slides as well as evidence of otter on the trail camera footage.

Two suspected holts were recorded during surveys. The first suspected holt (Holt 1) was located approximately 20m from the project footprint. The suspected holt consisted of an entrance in a peat ditch surrounded by scrub vegetation. Fresh spraint was

observed outside the entrance, and a second entrance was recorded on the opposite side of the ditch. A trail camera was deployed on 06 March 2025, and provided evidence of otter presence at this site. However, no observations were made of otter entering or exiting the suspected holt entrance. This feature is a suspected holt and has not been confirmed as an active holt.

The second suspected holt (Holt 2) was approx. 95m from the project. It consisted of an entrance in proximity to a watercourse. There were no signs of otter in the vicinity, and the suspected holt was considered inactive.

There was evidence of otter presence on the project site and within the 150m buffer area surveyed, in particular around the Owengarve river in the vicinity of turbine T1. No evidence of breeding otter was found within the redline boundary of the project site during field surveys.

Pine marten

Presence of pine marten was recorded at one location in the north of the project site by trail camera. Pine marten faeces were recorded at the edge of forestry in the near turbine T4. There were no direct sightings of pine marten and no evidence of breeding (e.g. dens) were found within the project site during field surveys.

Elevated arboreal cavities are the preferred structures in which this species construct their dens, as they offer pine marten effective insulation and protection from predators such as foxes (Birks *et al.* 2005). While there is ample woodland habitat within the project site, most of this is comprised of conifer plantations which typically do not possess many tree cavities, hollows etc. that are preferable for pine marten dens.

It is considered likely that the project site and surrounding area supports a population of pine marten, given that the species was recorded within the project site, and the presence of suitable woodland habitat within the immediate vicinity. Pine marten is listed on Annex IV of the Habitats Directive.

Red squirrel

Feeding signs were recorded in the form of a stockpile of discarded pinecones at the edge of forestry in near turbine T4. No individuals were observed and no confirmed active dreys were recorded within the project site during the surveys.

Although potential evidence of red squirrel was recorded within the project site, no evidence of populations of squirrel being significant at more than a local level was recorded.

5.3.3.4 Bats Field Study Results

Bat habitat suitability

The habitat within the project site offers moderate to high-quality commuting and foraging opportunities for a range of bat species. According to habitat suitability data from NBDC, soprano pipistrelle has the highest suitability within the area, followed by common pipistrelle and Leisler's bat, all of which are classified as having 'moderate' to 'high' suitability (**Table 12**). Brown long-eared bat also shows 'moderate' suitability, while Daubenton's bat, whiskered bat, and Natterer's bat are assessed as having 'low' suitability. Nathusius' pipistrelle and lesser horseshoe bat show 'very low' habitat suitability.

Preliminary surveys of potential roost features found no potential roosting features within the 300 m turbine area of impact consideration for bats. However, one derelict building was identified (see **Annex 5.5**) which had moderate potential for multiple roosting bats (PRF-M). There were some noticeable entry-points around the fascia, roof tiles, and windows. During the second survey, two bats were recorded emerging from the building. They emerged from the same entry point to the rear of the building under the soffit of the roof. One bat was confirmed to be a soprano pipistrelle. The other bat did not echolocate on exit, but a common pipistrelle was recorded foraging nearby shortly thereafter, so the second emergence is to be presumed to be a common pipistrelle. The two bats flew in tandem; foraging and social calling around the roost feature throughout the survey. See **Annex 5.6** for further details of PRF's.

Potential roosts along Electricity Line Route and Delivery Route

Preliminary roost feature assessments were carried out along the underground electricity line route, the turbine delivery route, and along the haul route upgrade works. Preliminary Roost Feature (PRF) assessments were undertaken along the grid connection route, the turbine delivery route, and the proposed road upgrade works. Two ecologists conducted drive-by and stop-search surveys, systematically travelling the routes and stopping at features of potential interest for bat roosting. These included mature trees with visible features such as cracks, splits, or loose bark, as well as derelict buildings, sheds, and structures near water crossings that could offer suitable roosting conditions for individual or multiple bats. At each identified feature, ecologists carried out visual inspections and, where access allowed, used endoscopes to examine crevices and cavities for evidence of bat presence or suitability for roosting. The assessment aimed to identify PRFs warranting further detailed survey or precautionary mitigation.

Roost emergence/re-entry surveys

Dusk emergence/dawn re-entry surveys were completed in 2023 to ascertain if PRFs identified during the Preliminary Roost Assessment (PRA) were used by bats. PRFs classified as low or moderate suitability were surveyed twice, at roost emergence or roost re-entry times. Surveys commenced 15-mins before sunset and up to 1.5-hours before sunrise in accordance with Collins *et al.* (2016). Dusk emergence/dawn re-entry surveys were undertaken using Elekon Batlogger M bat detectors to collect geo-referenced records of bat activity, which were then analysed using BatExplorer software. Survey times and roost survey effort are shown in **Table 4**.

Bat Activity Transect Walkover

Although activity across the project site was generally nil or low, the moderate levels of bat activity were recorded near bat habitat features such as watercourses and forestry. The forestry located within the project site is coniferous commercial forestry, however, it provides a foraging resource for certain species of bat such as Leisler's bat and common pipistrelle, particularly in the spring and summer. This is likely due to the absence of other bat habitat features in the rest of the project site.

Potential Roost Features (PRFs)

Preliminary roost feature assessments carried out along the grid connection route, the turbine delivery route, recorded total of 11 no. features that had potential for use by roosting bats (see **Table 19** and **Table 20**).

Feature ID	Feature description	PRF Suitability
F.1	Derelict building (west)	Moderate

Table 19: Potential Roost Features (PRFs) identified within the project site

Feature ID	Type	Classification
GCR-TDR1	Tree	Low (PRF-I)
GCR-TDR2	Tree	Low (PRF-I)
GCR-TDR3	Derelict cottage	Moderate
GCR-TDR4	Derelict building	Moderate
GCR-TDR5	Derelict building	Moderate
GCR-TDR6	Bridge	Low
GCR-TDR7	Derelict cottage	Negligible
GCR-TDR8	Stone shed	Moderate
GCR-TDR9	Bridge	Low
GCR-TDR10	Bridge	Low
GCR-TDR11	Bridge	Moderate

Table 20: List of potential roost features identified along the underground electricity line route & turbine component haul route

Static Detector Surveys

The following paragraphs provide accounts for the species recorded, giving details of any seasonal or distributional patterns that emerged. During the 2023 season, bat activity was recorded for a minimum of five species, including common pipistrelle, soprano pipistrelle, Leisler's bat, *Myotis* species and brown long-eared bat. Most of the bat activity was attributed to common pipistrelle and soprano pipistrelle with Leisler's bat also regularly recorded. These three species were recorded during all acoustic surveys performed. All the remaining species accounted for 9% of the bat activity recorded.

Note that D numbers, e.g. D1, refer to deployment location and do not necessarily translate to turbine location, which are referred to with the notation T, e.g. turbine number one is T1 (**Table 21**).

Table 21: Summary of mean bat activity recorded at each static detector during the three deployments

Detector	Spring	Common pipistrelle	Soprano pipistrelle	Leister's	Other	Summer	Common pipistrelle	Soprano pipistrelle	Leister's	Other	Autumn	Common pipistrelle	Soprano pipistrelle	Leister's	Other
D.01															
D.02															
D.03															
D.04															
D.05															
D.06															
D.07															
D.08															
D.09															
D.10															
D.11															
	High														
	Medium														
	Low														
	Nil														

Common pipistrelle records

Common pipistrelle was recorded at low levels across most detector locations during the spring 2023 survey period. The only exception was detector D.10, which registered medium activity levels, suggesting more regular use of this location relative to other detector locations during spring, potentially linked to nearby foraging routes or commuting features. Overall, spring activity for common pipistrelle was relatively subdued compared to later in the year, likely reflecting reduced seasonal activity or lower ambient insect availability during the early part of the bat active period. During the summer 2023 survey period, common pipistrelle activity remained generally low across most detector locations. Detector D.03 was the only location to register medium levels of activity, indicating a possible localised increase in activity relative to other detector locations during the summer survey period, potentially associated with adjacent linear habitat features. The consistent presence of low-level activity across the remaining detectors suggests widespread but relatively uniform use of the project site by common pipistrelles during the summer months. In autumn 2023, common pipistrelle activity was low across all but one detector location, with medium activity recorded only at D.11, which may be associated with the presence of a watercourse in the form of a drainage ditch which provides a source of invertebrate prey and shelter. This suggests that, similarly to previous seasons, common pipistrelle activity was generally widespread but concentrated in specific areas, such as D.11, which may represent a preferred foraging or commuting route during this time of year.

Soprano pipistrelle records

Soprano pipistrelle was recorded at low levels across all detector locations in spring 2023. This consistent pattern suggests that while the species was present throughout the project site, its activity was relatively subdued compared to other species, potentially reflecting lower foraging or commuting activity during the spring months. In summer 2023, soprano pipistrelle activity remained consistently low across all detectors. This pattern mirrors the spring findings, indicating that the species maintained a relatively low presence throughout the project site during the warmer months, possibly reflecting ongoing low foraging or commuting activity. During autumn 2023, soprano pipistrelle activity remained low across all detector locations, maintaining the same trend observed in both spring and summer. This consistency suggests that the species did not significantly increase its activity in the project site during the autumn period.

Leisler's bat records

In spring 2023, Leisler's bat activity was recorded at medium levels at D.02 and D.03; both were placed at proposed turbine locations, which are near to foraging and commuting habitat features adjacent to forestry habitat features that provide potential foraging and commuting opportunities, indicating localised foraging or commuting activity in these areas. Outside of these detectors, Leisler's bat activity was generally low across the project site. This suggests that while the species was active, it had a more focused presence in specific locations, with minimal widespread activity. During summer 2023, Leisler's bat was recorded at consistently low levels across all detector locations, maintaining a more dispersed presence throughout the project site. This suggests that no specific concentration of activity was identified during the summer survey period. Leisler's bat activity in autumn 2023 remained low across all detectors, continuing the trend observed in both spring and summer. The species did

not appear to show a seasonal increase in activity, indicating that it may have had a relatively consistent, albeit low, presence throughout the project site during the autumn months.

Other bat species records

Throughout the 2023 survey season, *Myotis* species (199 passes) and brown long-eared bat (31 passes) exhibited consistently low levels of activity across all detector locations. In spring, detectors D.07 and D.09 recorded no activity for these species, indicating activity by these species was not recorded at these detector locations during the survey period. Activity for both species was generally low across the remaining detectors, suggesting that their presence was widespread but minimal. This low level of activity continued into the summer and autumn, where no significant increase was noted, further confirming their low presence. At detector D.02 during autumn, where again no activity was recorded for *Myotis* species and brown long-eared bat. Overall, while these species were present within the project site, their activity remained low, with no seasonal peaks in presence or behaviour over the course of the year. This pattern is consistent with intermittent use of the project site by these species.

Bat Activity at Turbine T1

The proposed turbine location associated with (D.01) is situated in an area of open bog approximately 30m from a drainage feature and scattered scrub vegetation. These features are considered to provide relatively little foraging and commuting potential for bats, and activity levels recorded at this location were correspondingly low across all species. The detector remained in place throughout the survey period and was not relocated between deployments. There are no potential roost features of moderate or higher suitability within 300m of this location. As such, this turbine location is assessed as having low overall value to the local bat population in terms of both foraging opportunities and proximity to roost sites.

Bat Activity at Turbine T2

The proposed turbine location associated with D.02 lies within a dense pine plantation near the northern edge of the project site. The detector was mounted on a pine tree surrounded by closed-canopy conifers, offering sheltered conditions with moderate foraging and commuting potential. This was reflected in medium activity classifications recorded for common pipistrelle and Leisler's bat during the spring survey period. No roost features of moderate or higher suitability were identified within 300m. This turbine location is considered of moderate value for foraging bats, though it has limited value for roosting.

Bat Activity at Turbine T3

D.03 was located along the edge of a lodgepole pine plantation near a transition into more open habitat. The structural diversity here provides moderate suitability for foraging and commuting, which is consistent with the elevated activity recorded relative to several other detector locations, including medium common pipistrelle activity in summer and medium Leisler's bat activity in spring. Despite this, no roost features of moderate or higher suitability were recorded within 300m. The turbine

location is therefore considered of moderate value for bat activity associated with foraging, though not significant for roosting.

Bat Activity at Turbine T4

Situated on a section of clear-felled forestry over peat substrate, D.04 was associated with open, exposed conditions offering low foraging and commuting potential. Bat activity at this Site was correspondingly low. No potential roost features of moderate or higher suitability were identified within 300m. The turbine location is therefore assessed as having low ecological value for local bat populations.

Bat Activity at Turbine T5

This location is positioned within an area of open bogland adjacent to historical peat cutting activity. Habitat here is homogenous and exposed, offering low suitability for foraging or commuting bats. Bat activity recorded here was minimal, and there were no potential roost features of moderate or higher suitability identified within 300m. The turbine location is therefore of low value to bats.

Bat Activity at Turbine T6

D.06 was placed in a remote area of open bog, with only scattered scrub and small watercourses nearby, situated near the western study boundary. These features offer only limited foraging or commuting value, and bat activity was low. The nearest potential roost, a derelict house, lies 400 m southeast of the detector, outside the 300 m assessment buffer. The turbine location is assessed as having low to moderate foraging value, but low value for roosting.

Bat Activity at Turbine T7

D.07 was installed on cutover bog adjacent to scattered scrub vegetation, offering some potential for commuting and foraging. However, despite slightly better habitat conditions compared to open bog sites, bat activity remained low. No roost features of moderate or higher suitability were identified within 300m. The turbine location is considered of moderate foraging value, though roosting value is low.

Bat Activity at Turbine T8

This turbine location is similar in character to D.07, located on cutover bog with scrub vegetation, which provides some foraging and commuting opportunities. Despite these habitat features, bat activity remained consistently low across all seasons. There are no moderate or high suitability roost features within 300m. The turbine location is therefore of moderate value for occasional bat activity, but of low roosting significance.

Bat Activity at Turbine T9

D.10 corresponds to Turbine T9, located on cutaway bog approximately 5m from a deep bog drain with standing water. This water feature and adjacent open structure contribute to moderate commuting and foraging potential, likely supporting prey availability. Bat activity at this location was higher than at several other detector locations, particularly for common pipistrelle, which showed moderate activity during the spring season. However, no roost features of moderate or higher suitability were

identified within 300m. Overall, this turbine location is assessed as being of moderate value for foraging bats and low value for roosting.

Bat Activity at Turbine T10

D.11 was positioned adjacent to a cutover bank in open bog habitat and corresponds to Turbine T10. The surrounding landscape offers generally low suitability for foraging and commuting, with sparse structural features and limited cover. Bat activity was low throughout the 2023 season, with only a modest increase in common pipistrelle activity during the autumn. No potential roost features of moderate or higher suitability were present within 300m. As such, this turbine location is assessed as having low overall value to bats.

Context Unpaired Turbine Monitoring

D.09 was deployed on exposed blanket bog, well removed from any notable vegetation or structural features. The surrounding habitat is to provide relatively low foraging and commuting potential, offering minimal cover or prey aggregation. Bat activity was consistently low across all survey seasons, and no roost features of moderate or higher suitability were recorded within a 300m radius. Additionally, no activity from other species (*Myotis* sp. or brown long-eared bat) was recorded here. This location is not directly associated with a proposed turbine, will remain unaltered, and is considered to have low overall ecological value for bats.

5.3.3.5 Bird Field Study Results

The following sections provide the species accounts for birds utilising the project site.

Buzzard

Buzzard was infrequently observed in both seasons. There was a total of 17 observations for this species, 3 in the non-breeding season and 14 in breeding season. Twelve of these observations were exhibiting typical soaring/flying/circling behaviour, with one instance of perching. There was no breeding behaviour observed. Overall utilisation of the project site is relatively low. Given the green conservation status of this species, it is of Local (lower) ecological importance.

Black-headed gull

Black-headed gull was infrequently observed in both seasons. There were three flights in the 500m buffer with a total of four observations on VP surveys over the entire survey period. All observations were in 2023 and comprised a total of five individual birds, their behaviour was flying through the project site. Nine birds were observed once on a waterbird survey in 2021. Overall utilisation of the project site is very low. The project site holds no suitable breeding habitat; therefore, this species only utilises it for flying through. Therefore, it can be concluded there is no population of ecological importance using the project site.

Common gull

Common gull was very infrequently observed in both seasons. There were two observed flights in the 500m buffer on VP surveys over the entire survey period. Four birds were observed once on a wider area survey in 2021. Overall utilisation of the project site is very low. The project site holds no suitable breeding habitat; therefore,

this species only utilises it for transiting through. With no further observations, it is apparent that this species does not purposefully utilise this site. Therefore, it can be concluded there is no population of ecological importance using the project site.

Curlew

Curlew was observed six times in the 500 m turbine buffer with a total of 38 birds observed. The maximum flock size observed was 20 birds on a single occasion, but more typically 2-7 birds per flock were observed. The majority of observations were in the non-breeding season comprising this species flying through the project site with one instance of birds circling and landing to rest. Breeding season observations comprised observations only towards the end of the season which would likely be associated with migratory birds returning from breeding grounds, no breeding behaviour was observed on the project site. However, there are known breeding locations in north Roscommon and northeast Roscommon for Curlew (Harrison *et al.* 2023). The non-breeding population in Ireland is supplemented in winter by an influx of birds from Scandinavia and Scotland (NPWS, 2026) which typically transit to inland wetlands and coastal estuaries to winter.

Considering this species red conservation status, usage of the project site which is for predominantly transiting through in the migration/non-breeding season there is a non-breeding population of Local (higher) ecological importance.

Great black-backed gull

Great black-backed gull was only observed in breeding season 2021 with a total of five observations. The behaviour was flying through the project site, with no breeding behaviour observed. With no further observations, it is apparent that this species does not regularly utilise the project site. Therefore, it can be concluded there is no population of ecological importance using the project site.

Golden plover

Golden plover were predominantly observed in the non-breeding season. There were three observations of 39-60 bird flocks in breeding season both in late March 2020, these birds were on passage transiting through the region to breeding grounds in upland habitats in Ireland or Northern Europe. Peak flock counts of 300-500 birds were observed but more regularly flock sizes of 10-40 birds were typical in the non-breeding season. Although large numbers of birds (150-500) were recorded during VP surveys, this was only during three VP surveys. During the remainder of the VP surveys numbers of birds were <60 individuals, indicating that the project site and immediate surrounds were not regularly used by very large flocks. Usage of the project site ranges from flying through to landing briefly for presumed feeding or resting.

Golden plover records during targeted Walkover Surveys were low, with a peak of 19 birds recorded during a single visit. Birds regularly used the project site for flight activity, particularly the area of bog in the centre of the project site between T5, T6 and T7 and to the north-east of T1 for feeding and temporary resting. The species is known to occur in highly mobile flocks during the non-breeding season, moving across the wider landscape in response to habitat availability and feeding opportunities.

They are often in highly mobile flocks throughout the non-breeding season moving across wide areas in search of food and resting locations in suitable habitat. The all-

Ireland golden plover population is estimated at 90,770 (Burke, et al 2025). The number of birds at the project site does not approach the 1% threshold (910) necessary to be considered of national importance. .

While the numbers recorded do not approach the threshold for national importance, the project site supports a regularly occurring non-breeding population of a red-listed species, including occasional concentrations of several hundred birds. In the context of the frequency of records, peak flock sizes recorded and the conservation status of the species in Ireland, the golden plover population associated with the project site is considered to be of County ecological importance.

Grey heron

Grey heron was observed in both the non-breeding season and breeding season with a bias for observations in the non-breeding season. There were seven observations within the project site, the majority of which were flying through the project site over the bog habitats. Given the green conservation status of this species and low usage of the project site the population is of Local (lower) ecological importance.

Hen harrier

Hen harrier were observed throughout the year, although records in the breeding season were infrequent. Only two breeding season observations were recorded: a single bird in early March 2020, likely associated with non-breeding season activity, and a male hunting during summer 2021. Moderate flight activity was recorded during baseline surveys with a total of 36 flights recorded, the majority of which was in the north and west of the project site.

The majority of hen harrier activity recorded within the study area was associated with winter roosting behaviour which was recorded within three areas during baseline surveys with a total of 85 observations across four non-breeding seasons. Male and female/juvenile birds were present, with communal roosting recorded and a peak count of three roosting birds during a single survey. Further information relating to roosting hen harrier is detailed within **Annex 5.8**.

Winter roosts are recognised as important components of the hen harrier life cycle, providing refuge during the non-breeding season and supporting the survival of both juvenile and adult birds (O'Donoghue, 2020). In the context of the declining national breeding population, estimated at 103 breeding pairs in 2024 (Ruddock, 2024), the regular presence of two to three birds at the roosts is considered noteworthy. Given the conservation status of the species and the importance of the roosting resource identified within the study area, the non-breeding hen harrier population is considered to be of National ecological importance.

Herring gull

Herring gull were not a regular user of the project site. There were two observations of this species, which comprised a total of three birds over the entire survey period. One additional bird was observed in the wider area (5km). With such limited usage of the project site and apparent low usage of the wider area it can be concluded that there is no regularly occurring population of ecological importance is associated with the project site.

Kestrel

Kestrel was regularly observed in all seasons. In early survey years, activity was higher (43 observations) than in more recent years (2-8 observations). This could be due to population dynamics or subtle habitat change over this period making the project site and wider area less attractive to this species. Behaviour observed on Site was predominantly transiting and foraging. In two out of the four breeding seasons, juvenile birds were observed on the project site later in the season. This indicates that there is likely suitable breeding habitat within the wider area despite no territories/nests being observed within the 2km buffer.

Given the red conservation status of kestrel, and the occurrence within the project site, this population is of Local (higher) ecological importance.

Lapwing

Lapwing were observed in a single instance over the entire survey period. In mid-February 2022, a flock of 15 birds flew through the project site without alighting. Given the behaviour, this record can be ascribed to migrating birds. In non-breeding season in the wider area (5km) counts of lapwing were often observed with a typical count of 20 birds and a peak of 160. With only one observation within the project site, it can be concluded that there is no regular population of ecological importance utilising the project site.

Lesser black-backed gull

Lesser black-backed gull was observed in both breeding and non-breeding season within the project site with a total of 48 observations in VP surveys over seven seasons of survey. In non-breeding season, observations are sporadic and often were just of a single bird. In the breeding season, the species was more regularly observed in small groups or individuals. In two of the breeding seasons juvenile birds were observed with adults flying over the project site and looking for feeding opportunities. There was no breeding activity observed on Site and habitats are not suitable for this species to breed.

Therefore, given the amber conservation status of this species and regular usage of the project site (typically single birds), this species is of Local (higher) ecological importance.

Mallard

Mallard was observed in all seasons typical for this widespread species. They were predominantly utilising the ditch network in the cutover bog for feeding, typically 1-2 birds are observed each season. There was one instance of a juvenile bird in mid-breeding season; no nest was observed on the project site but this sighting indicates likely breeding in proximity to the drainage network. In context of the wider area winter counts range from 66-199 birds, demonstrating there is more suitable habitat within 5km of the project site. The project site would appear to aid support to a very small number of birds throughout the year. Despite the amber conservation status of this species, due to the low usage of the project site this species is of Local (lower) ecological importance.

Merlin

Merlin was observed during the breeding seasons 2020, 2021 and 2022 and non-breeding seasons 2019/20, 2020/21 and 2022/23, with no greater than three observations recorded in a season. The project site does have suitable foraging habitat, but the overall usage of the project site is sporadic in the non-breeding season, likely connected with prey availability. Breeding season observations were typically very early in the season and likely associated with non-breeding season behaviour. There were three observations in peak breeding season (May-July), two hunting flights and one alarm calling.

Breeding within the project site or within 2km is possible but due to the limited number of observations and only one observation of potential breeding behaviour (alarm calling) it is considered not to have occurred within the study period. The usage of the project site by merlin is relatively low with a total of 14 observations over the survey period and mostly sporadic hunting. Given the amber conservation status and the sporadic but regular occurrence, this species is of Local (higher) ecological importance.

Red grouse

Red grouse were observed throughout the project site all year round with a peak count of three birds in non-breeding season bird more typically encountered as individuals or pairs. This species is cryptic in nature, well camouflaged in moorland habitat, where it reliant on heather dominance and often not seen unless flushed, therefore it can be underrepresented in the data. Both male and female birds were observed once during the 2021 breeding season. No nests were found, as these are often concealed in dense heather on the ground. With the presence of suitable habitat and both male and female birds observed, this species may breed on the project site. The most recent national survey 2006-2008 estimated the all-Ireland population at 4,200 individuals and declining. Given the red conservation status of this species, sedentary nature, reliant on moorland habitat and all year presence at the site, this species is of County level ecological importance.

Ringed plover

Ringed plover were observed on a single day in mid-December 2020 during in the non-breeding season 2020/2021 with two birds being seen. It is likely this species was utilising the bog habitats for opportunistic feeding while moving through the area for winter foraging. No other observations were reported throughout the entire survey period. It is apparent that this species does not regularly utilise the project site. Therefore, it can be concluded there is no population of ecological importance using the project site.

Snipe

Snipe is a cryptic wader species that is difficult to effectively survey during the winter, as birds tend to spend the majority of the day hidden away in vegetation, only becoming visible in flight, typically when flushed or at dusk/dawn when commuting between roosting and foraging areas, or on spring/autumn migration when more cohesive flocks are often observed. Due to the difficulty in counting snipe, no population estimate for the number of snipe wintering in Ireland is given in Lewis *et al.* (2019b), and therefore, there is no robust 1% threshold for national importance;

although previous I-WeBS reporting (Crowe, 2005) used a notional value, based on professional judgement, and applied an estimate of 100 birds for national importance.

Snipe were observed throughout both breeding and non-breeding seasons with a peak count of eight birds, but more typically 2-5 birds are observed in line with this species cryptic nature. During the 2020 and 2021 breeding seasons, there were a total of three breeding territories identified, one in 2020 and two separate territories in 2021. These breeding sites were associated with distinct areas holding wetland habitats. In 2022 and 2023 breeding was not confirmed but the project site remains suitable for breeding snipe. There is no definitive Irish population figure for this species with a best estimate of 5,000 pairs (Lauder & Donaghy 2008).

There is no county population estimates for breeding snipe; however, assuming a relatively even distribution across the country, an appropriate threshold for county importance is taken as 1.9 pairs (1% of 192 pairs).

Given this species red conservation status, and the presence of suitable breeding habitat and observed territorial behaviour within the project site, it is considered that the project site supports a population that is valued as County ecological importance.

Sparrowhawk

Sparrowhawk was observed at the project site throughout the year. Observations were often limited to a single bird observed at a time, generally there were 1-2 observations per season typical for a widespread species that hunts opportunistically throughout the landscape. Birds are mostly observed transiting through the project site, with occasional observations of hunting activity. On one occasion fledgling birds were observed in the north of the project site, there was no nest observed within the redline boundary of the project site or 2km buffer. This would indicate suitable breeding habitat exists elsewhere within the hinterland surrounding the project site. Given the green conservation status of this species and its limited presence on Site in all seasons, this species is of Local (lower) ecological importance.

Swift

Swift were only observed during the breeding season, typical for this summer visiting species. A peak count of four birds, but more typically 1-2 birds were observed in a single visit. The behaviour on the project site was flying through the project site feeding on the wing, typical behaviour for this species, there was no breeding behaviour observed, and the project site largely lacks typical nesting features for this species. Swift will opportunistically feed throughout the landscape during the summer months typically arriving late April and departing late August. The habitats on the project site provide a food source of flying insects for swift to utilise. Given the red-listed conservation status of this species and its regular use of the project site for foraging during the breeding season, the population associated with the project site is considered to be of Local (higher) ecological importance.

Whooper swan

Whooper swan were infrequently observed within the 500m turbine buffer. The largest flock size was 34 birds, although flocks of 5-9 birds were also observed. There was a total of 12 flocks observed between 2019-2021. In 2022 and 2023 survey years,

whooper swan was not observed over the project site. There were no observations of whooper swan landing within the project site, and all observations were flying through the project site. Whooper swan is cited as a qualifying interest species for the Lough Gara SPA (c. 3.2km away), and in the last five years the peak count was 78 birds at Lough Gara SPA.

Given this species is amber listed, Annex 1 status and the lack of observation since 2021 due to inconsistent flight paths and the lack of habitat features associated with feeding or roosting within the project site for whooper swan, the population observed is considered to be of Local (lower) ecological importance.

Woodcock

A single woodcock was recorded during the non-breeding season. Woodcock is a highly cryptic species that spends much of the daytime concealed within dense vegetation and is therefore frequently under-recorded during standard walkover and vantage point surveys. No breeding season records were obtained and there was no evidence of breeding activity within the project site.

The non-breeding season record is likely to relate to a wintering individual, reflecting the annual influx of birds to Ireland and the UK from continental Europe. The project site contains suitable wintering habitat and wet ground conditions favoured by the species.

While only a single individual was recorded, woodcock detectability during daylight surveys is inherently low and survey records are unlikely to represent the total number of birds using the project site. Given the availability of suitable wintering habitat, the known limitations associated with surveying this species, and its red-listed conservation status, woodcock is considered to be of Local (higher) ecological importance.

5.3.3.6 Freshwater Ecology Field Study Results

Benthic Invertebrates

The Q value scores indicate Moderate WFD classification at all sites, apart from Good status at one site on the Lung river; therefore, only this one site would meet the Water Framework Directive threshold of Good Ecological Status. The majority of survey sites were dominated by Group C (tolerant) taxa, while Group A (pollution-sensitive) taxa were present in all but one kick samples assessed.

The results of Q3-4 (Moderate) recorded on the Owengarve in 2024 indicate a difference compared to the results recorded by the EPA in 2022, which gave a Q4-5 (High) classification at the location corresponding to survey site 9, and an overall Good status for the Owengarve_010 waterbody.

The results of the Q value assessments in the Lung river survey sites ranged from Q3-4 (Moderate) to Q4 (Good). The most recent WFD assessments completed by the EPA in 2023, resulted in Good WFD status for this section of river (Lung_050).

Channel substrate was made up of cobble and coarse gravel for the majority of sites, which is indicative of an eroding upland channel. Instream habitats consisted of run, riffle and glide habitat, while instream vegetation was sparse as expected. Riparian vegetation consisted of heather and some sections of coniferous forestry. The

adjacent land-use was forestry, turbary and agriculture with improved grassland habitat.

The Q-value results provided, together with the basic water quality parameters obtained (e.g. pH), suggest that these waterbodies are affected by slight levels of pollution. Pollution episodes arising from agriculture/forestry/turbary may be having some effect on the water quality within the project sites assessed, resulting in “Slightly Polluted” status.

Water Quality

Dissolved oxygen remained above 6 mg/L at all sites and almost all occasions, although the overall saturation fell below the required 80% at several sites on the Owengarve river. Nutrient concentrations were generally low, and within acceptable levels.

Pollution indicators were generally within acceptable ranges, although several high total petroleum hydrocarbon (TPH) readings were recorded. TPH is an indicator of contaminants such as oil-based fuels; however, in this case all readings were defined as ‘Unknown Pattern’, indicating the presence of naturally forming hydrocarbons in the sample that cannot be attributed to a hydrocarbon with a known ‘fingerprint’ such as diesel or kerosene. Therefore, they are assumed to be natural derivatives of the peat in the catchment.

All sites had low suspended solid concentrations on all occasions, apart from Site 4 where a high 37 mg/L was recorded in October 2024; this coincided with adverse weather conditions such as torrential rain.

In summary, therefore, water quality is considered to be generally good in the catchment, although with evidence of some issues which, although individually short term, may have a cumulative impact on the catchment.

Freshwater Pearl Mussel

Based on the general riverine habitat, topography, gradient, substrate and surrounding habitat, the potential for this species to be present was universally poor. Therefore, no freshwater pearl mussel survey was carried out within the streams of the project site.

The desk study found no known records of freshwater pearl mussel in the Owengarve River or Lung River. There are three freshwater pearl mussel sensitive areas within the Moy and Killala Bay catchment. The closest distance from the project to a mussel sensitive area is 20km, connected hydrologically upstream of a downstream confluence. There is no direct downstream hydrological connection to any known freshwater pearl mussel populations.

Crayfish

NBDC data from 2022, showed that white-clawed crayfish were previously recorded in the Moy Killala catchment approximately 22 km downstream of the project. No crayfish were recovered during the baited trap surveys in the Owengrave River, nor were there any signs of crayfish predation along the riverbanks (e.g. in otter spraint). Habitat in the lower reaches of the Owengarve River is considered suitable for white-

clawed crayfish, containing firm substrate with sufficient refuges present in the form of boulders/cobbles and crevices in overhanging banks.

NBDC data from 2021 showed that white-clawed crayfish were recorded in the Upper Shannon catchment in close proximity to the project site, having been previously observed in the main channel of the Lung River, near Ballaghaderren. Additional data from 2006 also showed white-clawed crayfish occurring in a tributary of the Lung river. One adult crayfish was visually observed at Site 6 during hand searches. There were no crayfish recovered during the baited trap surveys in the Lung River. Habitat in the Lung River tributary is also considered suitable for white-clawed crayfish. Crayfish is listed as a QI species for the River Moy SAC.

Fish Habitat

The most recent fish survey data obtained from the Water Framework Directive (WFD) Rivers Fish Ecological Status 2008-2022 layer. Presence of Salmon, Trout, Eel and other coarse fish was recorded from a site located 30km downstream of study area in the Moy catchment. Although not observed in these surveys, additional fish species such as lamprey, are assumed capable of using the full Moy system. Salmon, sea lamprey and brook lamprey are listed as Qualifying Interests (QIs) of the River Moy SAC.

Regarding the Upper Shannon catchment fish distribution and WFD fish ecological status, the closest site with data is approximately 30km downstream of study area. The most recent surveys concerning this section of the Upper Shannon were completed in 2016 and resulted in presence of bream, roach and perch. Atlantic salmon are considered highly unlikely to be found in this part of the catchment due to connectivity issues downstream and lamprey are assumed capable of using the full Upper Shannon system.

Overall, salmonid habitat was considered poor. Much of the fish habitat was characterised by glide and riffle sections with very few mixed juvenile (fry/parr) habitat and limited potential for salmonids was observed. The substrate consisted of cobble and boulder in the upper sections. Overall, the assessed reaches were considered to have poor suitability for salmonid due to the lower gradient and slower flows. Lamprey habitat was poor across all survey sites in the study area. Suitable spawning habitat by way of finer, unbedded gravels for the creation of redds, and finer sediment (silt) accumulations suitable for larval (ammocoete) settlement were absent from all sites surveyed.

5.3.3.7 Amphibians and Reptiles

Frogs were observed at two locations and frog spawn at 6 locations within the project site (**Table 22**). This species is considered a feature of local (lower) importance and is therefore not considered further within this EIAR.

One count of common lizard was observed within the project site. This record (ITM E562159 N800569) comes from the (PB4) Cutover bog and potential marsh fritillary habitat located to the north of T2. The project site is likely to support a population of local (higher) importance. The potential for indirect habitat loss impacts upon this species has consequently been considered further within this assessment.

Two counts of smooth newt were observed within the project site. The record (E561800 N797386) comes the (PB4) Cutover bog potential marsh fritillary habitat located to the south of T10. The project site is likely to support a population of local (higher)

importance. The potential for indirect habitat loss impacts upon this species has consequently been considered further within this assessment.

Ecological Feature	Location
Frog	E560972 N799561
Frog	E562092 N799475
Frog spawn	E562487 N799747
Frog spawn	E562523 N799768
Frog spawn	E561023 N799489
Frog spawn	E561712 N800612
Frog spawn	E561628 N800380
Frog spawn	E561509 N798936

Table 22: Locations of frogs and frog spawn within the project site

5.3.3.8 Invertebrates

Habitat Condition Assessment

Potentially suitable marsh fritillary habitat (0.7ha) was identified to the east of turbine T1. However, no larval webs were identified here during the surveys. The habitat is (PB4) Cutover bog with frequent scrub throughout. Tall scrub cover is an estimated 35% and is composed of eared willow (*Salix aurita*) and lodgepole pine (*Pinus contorta*). Peat hags also provide shelter. The vegetation is likely to rank to be considered structured with purple moor-grass (*Molinia caerulea*) dominant in places. Despite the abundance of devil's-bit scabious, no marsh fritillary larval webs were identified in the area. The condition of the potentially suitable marsh fritillary habitat at T1 was assessed as *Suitable under-grazed*. The frequency of devil's-bit scabious at >3 plants/m² in >25cm tall swards is 37% and 7% frequency of devil's-bit scabious at >3 plants/m² growing in 12-25% tall swards. The threshold for qualifying as *Suitable under grazed* is:-

>20% frequency of devil's-bit scabious at >3 plants/m² growing in >25cm tall swards and <20% frequency of devil's-bit scabious at >3 plants/m² growing in 12-25% tall swards (**Table 23**).

Summary of Attributes	Percentage Frequency
% Frequency of Scabious 1-2plants/m ²	17%
% Frequency of Scabious 3-9 plants/m ²	37%
% Frequency of Scabious 10+ plants/m ²	10%
% Frequency of 12-25cm swards	12%
% Frequency of Scabious >3 plants/m ² in <12cm swards	2%
% Frequency of Scabious >3 plants/m ² in 12-25 cm swards	7%
% Frequency of Scabious >3 plants/m ² in >25 cm swards	37%
% Frequency of structured vegetation	61%
% Frequency of low invading scrub	61%
% Frequency of stock grazing signs	0%

Summary of Attributes	Percentage Frequency
% Tall (>0.5 m) scrub cover	35%

Table 23: Habitat condition assessment survey results from the potential marsh fritillary habitat to the east of T1

The marsh fritillary habitat (0.6ha) at turbine T10 is dominated by revegetated (PB4) Cutover bog and has an undulating topography with a variety of micro-aspects. There is no evidence of grazing, and the survey area is fenced on four sides. The project site is sheltered by hedgerows and invading tall scrub with an estimated coverage of 35%. Structure is given to the sward from low invading scrub from bramble, downy birch and eared willow, as well as tussocks of purple moor-grass, and an access track which has a shorter sward height due to frequent disturbance.

Three larval webs of marsh fritillary were found along the 100m transect and an additional one larval web was identified outside of the 100m transect (**Table 25**). All four larval webs are located within the footprint of the project.

In the marsh fritillary habitat at T10, the frequency of devil's-bit scabious at >3 plants/m² in >25cm tall swards is 68% and 0% frequency of devil's-bit scabious at >3 plants/m² growing in 12-25% tall swards. As such, the habitat condition was assessed as *Suitable under-grazed*. The threshold for qualifying as Suitable under grazed is:-

>20% frequency of devil's-bit scabious at >3 plants/m² growing in >25cm tall swards and <20% frequency of devil's-bit scabious at >3 plants/m² growing in 12-25% tall swards (**Table 24**).

Summary of Attributes	Percentage Frequency
% Frequency of Scabious 1-2plants/m ²	17%
% Frequency of Scabious 3-9 plants/m ²	37%
% Frequency of Scabious 10+ plants/m ²	10%
% Frequency of 12-25cm swards	12%
% Frequency of Scabious >3 plants/m ² in <12cm swards	2%
% Frequency of Scabious >3 plants/m ² in 12-25 cm swards	7%
% Frequency of Scabious >3 plants/m ² in >25 cm swards	37%
% Frequency of structured vegetation	61%
% Frequency of low invading scrub	61%
% Frequency of stock grazing signs	0%
% Tall (>0.5 m) scrub cover	35%

Table 24: Habitat condition assessment survey results from the potential marsh fritillary habitat to the east of T10.

Marsh Fritillary Larval Web	Location
Larval Web 1	E561801 N797382
Larval Web 2	E561773 N797358
Larval Web 3	E561773 N797355

Marsh Fritillary Larval Web	Location
Larval Web 4	E561781 N797352

Table 25: Locations of marsh fritillary larval webs at T10

Marsh fritillary butterfly is known to re-colonise suitable habitat from a distance of 3 to 10km (DEARA, 2023). Bricklieve Mountains and Keishcorran SAC is located 13.8km to the potential marsh fritillary habitat at T1 and 16.5km to the marsh fritillary habitat at T10. Given these distances exceed the known dispersal range, the local population of marsh fritillary identified at T10 is not ecologically connected with the SAC population.

The data collected during the habitat suitability assessment and larval web searches have been tabulated and can be viewed in **Annex 5.11**.

5.4 SUMMARY OF IMPORTANT ECOLOGICAL FEATURES

Important Ecological Features (IEFs) that are valued as being of Local Importance (higher) or above, and which have been identified as potentially at risk of significant effects through source–pathway–receptor linkages associated with the project, are detailed in **Table 26**.

Feature	Ecological Valuation	Important Ecological Feature?
Designated Sites		
Ramsar sites	International importance	Yes
Natura 2000 sites (SACs/SPAs)	International importance	Yes
National sites (NHAs/pNHAs)	National importance	Yes
Habitats		
(BL3) Buildings and artificial surfaces	Local (lower) importance	No
(ED2) Spoil and bare ground	Local (lower) importance	No
(FW4) Drainage ditch	Local (higher) importance	Yes
(GA1) Improved grassland	Local (lower) importance	No
(GS3) Dry-humid acid grassland	Local (lower) importance	No
(GS4) Wet grassland	Local (lower) importance	No
(PB2) Upland blanket bog	National/County importance	Yes
(PB4) Cutover bog	County/Local (higher) importance	Yes
(WD4) Conifer plantation	Local (lower) importance	No
(WL1) Hedgerows	Local (higher) importance	Yes
(WL2) Treelines	Local (higher) importance	Yes
(WN7) Bog woodland	Local (higher) importance	Yes
(WS1) Scrub	Local (higher) importance	Yes
Mammals		
Badger	Local (higher) importance	Yes
Small mammals (pygmy shrew, hedgehog, Irish hare)	Local (higher) importance	Yes
Otter	Local (higher) importance	Yes
Bats		
Foraging/commuting bats	Local (higher) importance	Yes

Feature	Ecological Valuation	Important Ecological Feature?
Roosting bats	Local (higher) importance	Yes
Birds		
Buzzard	Local (lower) importance	No
Black-headed gull	No ecological importance	No
Common gull	No ecological importance	No
Curlew	Local (higher) importance	Yes
Great black-backed gull	No ecological importance	No
Golden plover	County importance (non-breeding)	Yes
Grey heron	Local (lower) importance	No
Hen harrier	National importance (non-breeding)	Yes
Herring gull	No ecological importance	No
Kestrel	Local (higher) importance	Yes
Lapwing	No ecological importance	No
Lesser black-backed gull	Local (higher) importance	Yes
Mallard	Local (lower) importance	No
Merlin	Local (higher) importance	Yes
Red grouse	County importance	Yes
Ringed plover	No ecological importance	No
Snipe	County importance	Yes
Sparrowhawk	Local (lower) importance	No
Swift	Local (higher) importance	Yes
Whooper swan	Local (lower) importance	No
Woodcock	Local (higher) importance	Yes
Aquatic & Fisheries		
Aquatic & fish species	County importance	Yes
Amphibians & reptiles		
Common frog	Local (lower) importance	No
Smooth newt	Local (higher) importance	Yes
Common lizard	Local (higher) importance	Yes
Invertebrates		
Marsh fritillary	County importance	Yes

Table 26: Valuation of Important Ecological Features in relation to the onshore infrastructure of the project site

5.5 DESCRIPTION OF LIKELY EFFECTS

Section 5.2.4 sets out the criteria and approach to the ecological impact assessment that follows best practice guidelines (CIEEM, 2024). Likely significant effects have been assessed for Important Ecological Features only, as listed in **Table 26**. An impact is considered to be ecologically significant if it is predicted to affect the integrity or conservation status of an Important Ecological Feature at a specified geographical scale.

5.5.1 MITIGATION BY DESIGN

The assessment presented in this section takes account of mitigation measures incorporated into the design of the project through the iterative, constraints-led design process described in **Chapter 3**. These measures form part of the project and have therefore been incorporated into the design scenario assessed within this chapter. This includes:

- The avoidance and minimisation of impacts on sensitive ecological receptors through iterative layout design and infrastructure siting;
- The retention of sensitive habitats and ecological features where practicable;
- The integration of surface water management and drainage measures designed to protect downstream aquatic receptors and maintain hydrological connectivity;
- The use of existing infrastructure and road corridors where practicable, particularly in relation to the underground electricity line route;
- Design measures intended to minimise habitat loss, fragmentation and disturbance to protected species; and,

5.5.2 EMBEDDED MITIGATION

Embedded mitigation has also been proposed; this is mitigation which is considered best practice and is required to comply with standard environmental legislation. Effects have been evaluated with these measures in place, reflecting the final design of the project rather than the unmitigated project design.

Embedded mitigation includes:

- Prior to the commencement of construction works, a suitably qualified Ecological Clerk of Works (ECoW) shall be appointed to oversee implementation of the ecological embedded mitigation measures. All mitigation measures detailed below shall be incorporated into the CEMP. The CEMP is a live document that must be maintained by the appointed contractor onsite. The ECoW shall have responsibility for:-
 - Advising the Contractor on ecological constraints and mitigation requirements;
 - Supervising implementation of ecological mitigation measures;
 - Undertaking ecological inspections and audits during construction;
 - Providing toolbox talks to all construction personnel, detailing the following:
 - Identification of sensitive ecological receptors;
 - Protected species awareness;
 - Biosecurity requirements;
 - Pollution prevention procedures;
 - Construction exclusion zones;
 - Procedures to follow if protected species are encountered

- Undertaking (and/or commissioning) pre-construction surveys by competent surveyors as follows:-
 - Pre-construction habitat surveys by a botanist in March to September prior to works commencing on site, to ensure that the baseline information has not significantly changed.
 - A pre-construction survey to update all information regarding Invasive Species Management by a suitably experienced Ecologist.
 - An appropriately qualified arboriculturist will undertake a pre-construction assessment to ensure impacts to vegetation (namely Root Protection Zones) are avoided and this will be included in the CEMP.
 - Pre-construction surveys by a suitably qualified ornithologist for general nesting birds ahead of vegetation clearance or other works which could disturb/destroy nesting birds undertaken between March and August.
 - Pre-construction survey (by a suitably qualified ornithologist) for roosting raptors within 750 m of any construction works during the non-breeding season to determine presence of any roosting raptor species. Surveys should be undertaken in line with guidance from Hardey *et al.* (2013) between March and August.
 - Pre-construction surveys for mammals across the project footprint, including relevant areas where works are to occur along the TDR and GCR. This should be carried out 4-6 months prior to works on site (by a suitably experienced Ecologist) to update all mammal survey information (particularly for bats, badgers, otter, red squirrel and pine marten) and to allow for the relevant licensing and mitigation to be put in place as necessary.
 - Pre-construction surveys for marsh fritillary butterfly (by a suitably experienced Ecologist) in Mid-August/September and early/October to update larval web locations on the Site.
 - Due to the passage of time from initial site surveys to the start of construction works, a preconstruction invasive species survey must be carried out to determine baseline conditions for the presence of invasive species.
- The incorporation of appropriate stand-off distances and ecological buffers required as a result of pre-construction surveys, for example to avoid any disturbance effects on breeding or roosting bird species.
- Monitoring implementation of water quality protection measures.
- Results of pre-construction invasive species survey should be presented in a site-specific Invasive Species Management Plan (ISMP) which must be completed by the Appointed Contractor. The Management Plan will set out strict biosecurity measures with reference to Best Practice guidance to ensure there is no potential for the spread of alien invasive species during the construction works.
- Implementation of biosecurity protocols. An ISMP will be required to be completed by the appointed contractor for areas where invasive species

have been identified has been identified and avoidance is not possible before any machinery enters these areas. This management plan will set out strict biosecurity measures with reference to Best Practice guidance to ensure there is no potential for the spread of alien invasive species within or outside of the project site.

- Measures within the ISMP will include the avoidance of invasive species within the project site and if avoidance is not possible then removal and treatment measures will be required to be used to prevent the spread of alien species. the management plan will state that a specialist invasive species contractor be employed during the project life to ensure all removal and treatment is carried under the appropriate licensing and guidance.

5.5.3 DO NOTHING SCENARIO

Under the do-nothing scenario, it is likely that the baseline conditions of the project site would continue to exist as they are under the current land management practices. Further details in relation to this scenario are provided for the identified IEFs below.

5.5.3.1 Habitats

As several on-going threats to the integrity of the (PB2) Upland blanket bog and (PB4) Cutover bog have been identified, it is likely these habitats will continue to degrade overtime. Active threats include peat extraction, drainage, infrastructure, invasive non-native species, and natural wildfire. As such, it is likely there will be an on-going direct loss of (PB2) Upland blanket bog to be replaced by (PB4) Cutover bog. This change will likely be localised to the area surrounding T8, T9 and T10. Succession of (PB4) Cutover bog to scrub is likely and is facilitated by the aforementioned threats, specifically drainage. As such, the do-nothing scenario must include a predicted loss in area of Annex I habitat type 7130* Blanket bog (active), 7130 blanket bog, 7150 depressions on peat substrate of the Rynchosporion, and 4010 Northern Atlantic wet heath with *Erica tetralix*. The rate of this loss is difficult to predict although estimates for the loss of Annex I habitat type 7130* Blanket bog (active) suggest this could be at a rate of c. 3ha/year.

5.5.3.2 Terrestrial Mammals

If the project did not proceed, the existing mammal populations would continue to be supported by the peatland and woody habitats and likely fluctuate overtime with the influence from natural and anthropogenic processes.

5.5.3.3 Bats

If the project did not proceed, the existing bat populations would continue to be supported by the peatland and woody habitats and likely fluctuate overtime with influence from natural and anthropogenic processes.

5.5.3.4 Birds

If the project did not proceed, the existing bird populations would continue to be supported by the peatland habitats and likely fluctuate over time with influence from natural processes including succession and development of scrub for drier areas as

well as overriding population changes at a national and international scales. The influence of anthropogenic intervention related to peat cutting activities and agricultural/forestry practices would likely influence the species composition over time and potentially reduce habitat suitability for breeding waders.

5.5.3.5 Amphibians and Reptiles

If the project did not proceed, the peatland habitat currently supporting local populations of smooth newt (*Lissotriton vulgaris*) and common lizard (*Zootoca vivipara*) would remain physically intact. These species would continue to make use of existing peatland habitat, avoiding the direct mortality, habitat loss, habitat fragmentation and barrier effects associated with the project. Although continued habitat decline of (PB4) Cutover bog is likely due to pre-existing threats, the baseline ecological value of the project site would largely be preserved.

5.5.3.6 Invertebrates

If the project did not proceed the breeding population of marsh fritillary (*Euphydryas aurinia*) identified within the footprint of T10 would remain undisturbed in the short to medium term (<10 years). However, in the absence of any active management, the project site is at risk of progressive habitat degradation, particularly due to scrub encroachment, which may reduce the availability of suitable microhabitats over time. While this threat is not considered imminent, the impacts may become significant over a longer timescale (>10 years), potentially leading to the fragmentation or loss of suitable breeding areas for this species.

5.5.4 CONSTRUCTION PHASE

Construction phase impacts occurring at a magnitude that are expected to result in likely significant effects on Important Ecological Features include:-

- Temporary and permanent habitat loss and fragmentation;
- Permanent habitat loss and clearance of hedgerows and treelines around turbines to implement 86m bat buffers;
- Temporary creation of a barrier to movement at watercourse crossings;
- Permanent loss of nesting/roosting/foraging sites;
- Temporary lighting impacts from construction compounds; and,
- Excavation of trenches for cable ducting and storage of materials along the grid connection route.

Potential sources of indirect impacts during the construction phase:-

- Permanent habitat degradation resulting from drainage and/or other alteration of peatland hydrology;
- Temporary habitat degradation arising from dust deposition;
- Water quality impacts arising from surface water run-off containing sediments and/or an accidental pollution spill and/or alteration to pH;
- Disturbance and displacement of fauna;
- Spread of Invasive Alien Species; and,
- Dust impacts arising from construction activities.

5.5.4.1 Designated Sites

In relation to the project site, potential impacts to Natura 2000 sites and national sites (in the absence of mitigation) largely arise from the construction phase and include potential construction related hydrological impacts resulting in habitat degradation or impacts on species that rely on these habitats, and construction related disturbance and displacement impacts affecting species usage of roosting and/or feeding areas.

Natura 2000 and Internationally Designated Sites

Seven internationally designated sites within the Zone of Influence of the project were identified as having potential for significant effects prior to mitigation measures:

- Bellanagare Bog SPA [004105];
- Bricklieve Mountains and Keishcorran SAC [001656];
- Callow Bog SAC [000595];
- River Moy SAC [002298];
- Tullaghanrock Bog SAC [0002354];
- Lough Arrow SPA [004050]; and,
- Lough Gara SPA [004048]

Out of these sites, only Callow Bog SAC, River Moy SAC, Tullaghanrock Bog SAC, and Lough Gara SPA have hydrological connectivity to the project site.

In the absence of mitigation, indirect downstream water quality impacts on these sites have the potential to result from watercourse crossings involving near-stream works, general construction activities, and the installation of the drainage network. These activities have the potential to increase suspended solids and pollutants in surface water run-off and increase potential for the transmission of invasive non-native species (INNS).

In the absence of mitigation, potential effects on these sites during the construction phase of the project have been identified, namely:-

- Accidental emissions to water including silt, hydrocarbons/ oils and concrete waste;
- Noise and visual disturbance;
- Displacement from foraging or roosting areas and collision risk; and
- Invasive non-native species transmission.

In the absence of mitigation, the project is likely to have significant effects of international importance on the integrity of the listed international sites during the construction phase.

National sites

No NHAs were identified as having potential source-pathway-receptor linkages with the project.

Several pNHAs were identified as having potential source-pathway-receptor linkages with the project, which could give rise to likely significant effects including:-

- Derrynabrock Bog pNHA (5.1 km NW),
- Feenagh and Bunnamuck Loughs pNHA (12 km NE),
- Gowlaun Bog pNHA (5.04 km NW),
- Kilgarraiff Bog pNHA (4.54 km NW),
- Lough Gara pNHA (2 km E),
- Lough Glinn pNHA (9.15 km S),
- Moylough Turlough pNHA (10.24 km NW),
- Quarryfield West Turlough pNHA (9.52 km NW), and
- Tullaghanrock Bog pNHA (0.75 km E).

Degradation of Water Quality

Hydrological connectivity was established between the project site and the following pNHAs including:-

- Derrynabrock Bog pNHA (5.1 km NW);
- Gowlaun Bog pNHA (5.04 km NW);
- Kilgarraiff Bog pNHA (4.54 km NW); and,
- Tullaghanrock Bog pNHA (0.75km E).

The project site synopsis are not available online for these identified sites. However, it is assumed that peatland habitats are a primary conservation interest in this location. Derrynabrock Bog, Gowlaun Bog, and Kilgarraiff Bog are located directly adjacent to each other. Derrynabrock Bog is located 5.1 km downstream of the project site, Gowlaun Bog is located 5.0 km downstream of the project site, and Kilgarraiff Bog is located 4.5 km downstream of the project site. As well as being a pNHA, Tullaghanrock Bog is also designated as an SAC and is located 0.75 km downstream of the project site.

In the absence of mitigation, there is potential for indirect impacts to result in a likely significant effect on these nationally designated sites and their features of interest through construction phase impacts including water quality impacts, dust impacts and/or disturbance and displacement impacts to associated fauna and/or the transmission of invasive species. Downstream water quality impacts affecting these national sites could arise from watercourse crossings involving in-stream or near-stream works and the increase of suspended solids/pollutants in the surface water run-off. Such impacts may result in the degradation of habitats, cause adverse impacts to fauna if they come into direct contact with suspended solids/pollutants, or may adversely impact habitat for which fauna (e.g. wintering waterbirds) rely on for roosting and/or feeding. In any of these cases downstream water quality impacts are likely to result in a minor effect due to the scale of works, prevailing best practice standards, and the dilution potential in watercourses, as described in **Chapter 7** (Water). However, in the absence of mitigation, negative, temporary to short-term (i.e. during the period of suspended solids/pollutants in the surface water run-off), reversible likely significant effects are predicted at a local geographical scale on these hydrologically connected national sites.

In addition, due to the close proximity of the turbine delivery route to Tullaghanrock pNHA and Lough Gara pNHA there is, albeit limited, potential for hydrogeological connectivity and groundwater discharge to the pNHA. As groundwater flow is slow, the infiltration capacity of the soil will limit how much of an accidental spill can enter the ground. Groundwater contamination plumes develop over years of sustained release (e.g. from unlined landfills or brownfield sites). In this scenario, the only potential for effects is as a result of a significant accidental spill. However, contamination of the pNHA, as outlined above via surface waters travelling over-ground remains a risk. There are no other locations where hydrogeological connectivity has been identified.

Significance of effect: In the absence of mitigation, negative, temporary to short-term (i.e. during the period of suspended solids/pollutants in the surface water run-off), reversible likely significant effects arising from water quality impacts are predicted at a local geographical scale on hydrologically connected national sites, which include: - Derrynabrock Bog pNHA, Gowlaun Bog pNHA, Kilgarraff Bog pNHA, Tullaghanrock Bog pNHA and Lough Gara pNHA. The significant effects on Lough Gara pNHA have also been considered under the section on construction phase impacts on Natura 2000 sites.

Degradation of Habitats arising from Dust Deposition

Typically, dust impacts are localised, however under dry and windy weather conditions dust can travel a significant distance from the source. For those sites immediately adjacent to the project site including, Tullaghan Bog pNHA, and Lough Gara pNHA dust impacts may arise, however these are expected to be minor and temporary. As such, these effects are not likely to be significant on national sites immediately adjacent to the project.

5.5.4.2 Habitats

The impact assessment for habitats addresses effects on features identified as Important Ecological Features within the footprint of the project as well as the indirect impacts on those habitats within the Zone of Influence of the project. Habitats have been identified as Important Ecological Features either for their correspondence to Annex I habitat types, species richness, semi-natural characteristics, and/or limited occurrence and distribution at a defined geographical scale. Habitats that have been evaluated as Local (lower) ecological importance are not brought forward to the impact assessment stage (**Table 27**).

The project will result in the direct loss of approximately 26.08ha of habitat and 3.58km of linear habitat (**Figures 1 – 4**). A direct loss of 25.16ha and 3.31km will occur as a result of the construction of project infrastructure including; the turbine foundations, turbine hardstandings, access rounds, construction compounds, and on-site sub-station (**Table 28**). An additional direct loss of 0.92ha and 0.27km will occur as a result of road widening works associated with the turbine delivery route along the lesser roads (**Table 28**).

Calculations for the direct loss of Annex I habitats have also been made, for clarity and transparency. However, it is important to note these losses are not in addition to those identified under the Fossitt (2000) habitat classification. Instead, they represent an alternative method of assessing habitat loss, specifically focused on Annex I habitat types. As previously explained, the Fossitt (2000) habitats (PB2) Upland blanket

bog and (PB4) Cutover bog corresponds to the Annex I habitat types listed in (Table 18).

Fossitt Habitat Code & Classification	Ecological Valuation	Direct Loss of Area/Length (ha/km)		
		Wind Farm	Road widening	Total
(FW4) Drainage ditch	Local (higher)	c. 3.06km	c. 0.06km	c. 3.12km
(PB2) Upland blanket bog	National/County	c. 2.63ha	-	c. 2.63ha
(PB4) Cutover bog	County/Local (higher) importance	c. 13.60ha	c.0.35ha	c.13.95ha
(WL1) Hedgerows	Local (higher)	c. 0.26km	c. 0.20km	c. 0.46km
(WL2) Treelines	Local (higher)	-	c. 0.005km	c. 0.005km
(WN7) Bog woodland	Local (higher)	-	< 0.01ha	<0.01ha
(WS1) Scrub	Local (higher)	c. 1.27ha	c. 0.02ha	c. 1.29ha

Table 27: Direct loss of Fossitt (2000) habitats as a result of the project

Annex I Code & Habitat Classification	Monitoring Stop	Fossitt 2000 Category	Ecological Valuation	Direct Loss of Area/Length (ha/km)		
				Wind Farm	Road Widening	Total
7130* Blanket bog (active)	Pass	(PB2) Upland blanket bog	National	c. 0.11ha	-	c. 0.11ha
7130* Blanket bog (active)	Fail	(PB2) Upland blanket bog	County	c. 2.42ha	-	c. 2.42ha
7130 Blanket bog (inactive)	Fail	(PB2) Upland blanket bog	County	c. 0.10ha	-	c. 0.10ha
7130* Blanket bog (active)	Pass/Fail	(PB4) Cutover bog	County	c. 7.35ha	c. 0.34ha	c. 7.69ha
7130 Blanket bog (inactive)	Fail	(PB4) Cutover bog	Local (higher)	c. 5.85ha	c. 0.01ha	c. 5.86ha
4010 Northern Atlantic wet heaths with <i>Erica tetralix</i>	Fail	(PB4) Cutover bog	Local (higher)	c. 0.40ha	-	c. 0.40ha
7150 Depressions on peat substrates of the <i>Rhynchosporion</i>	N/A	(PB2) Upland blanket bog/ (PB4) Cutover bog	County	-	-	-

Table 28: Direct loss of Annex I habitat type as a result of the project

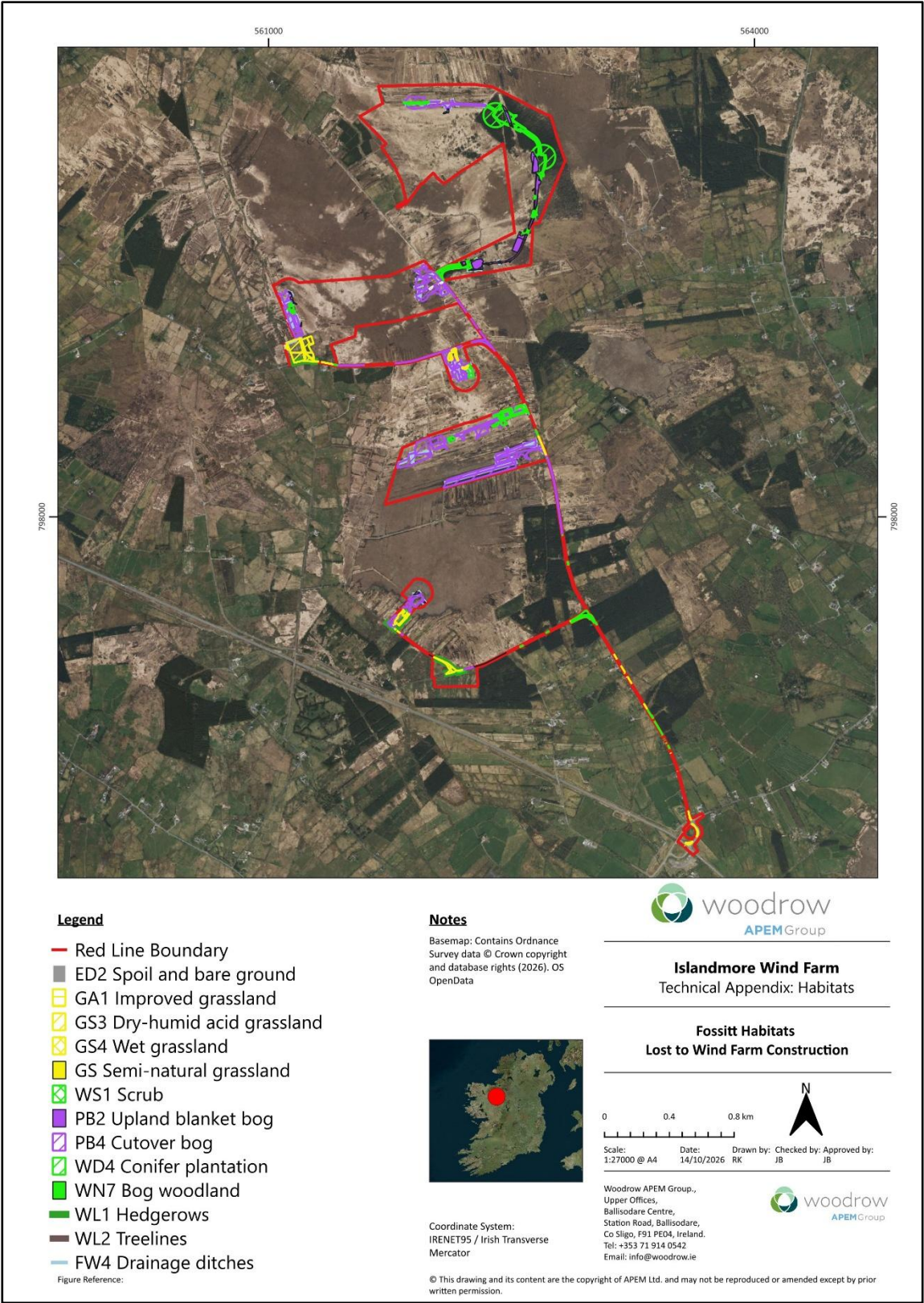


Figure 1: Fossil habitats lost to wind farm construction

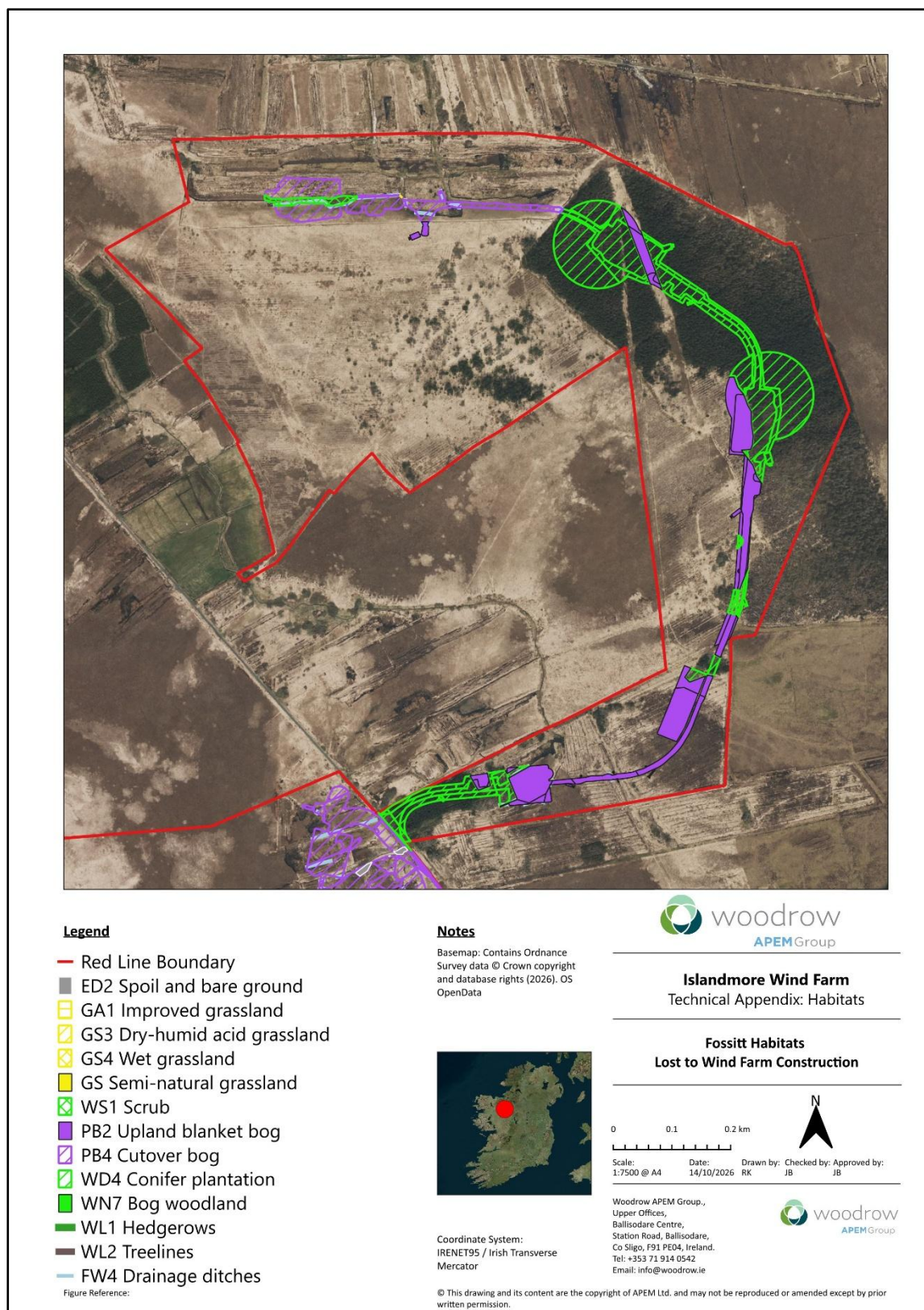


Figure 2: Fossitt habitats lost to wind farm construction

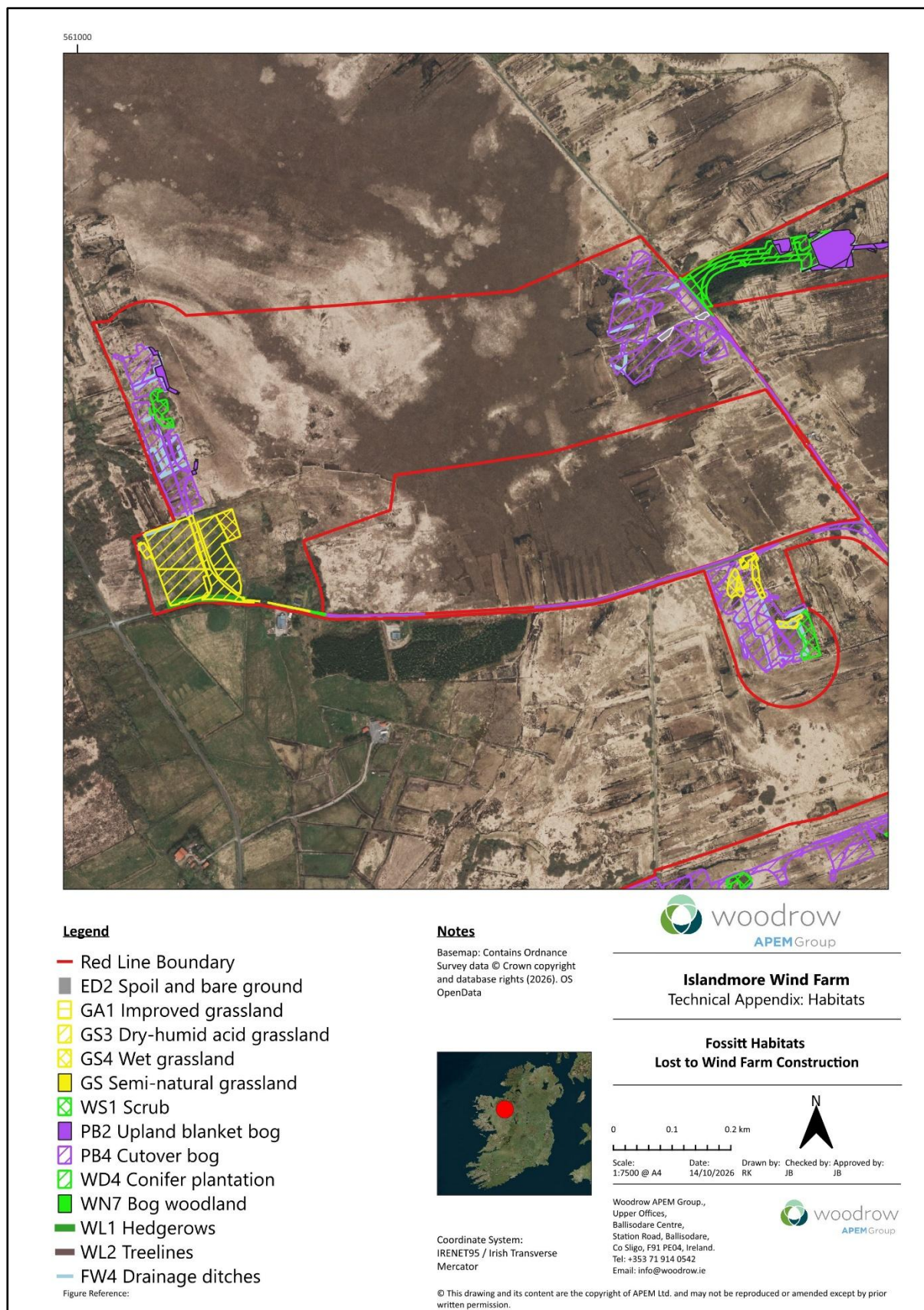


Figure 3: Fossil habitats lost to wind farm construction

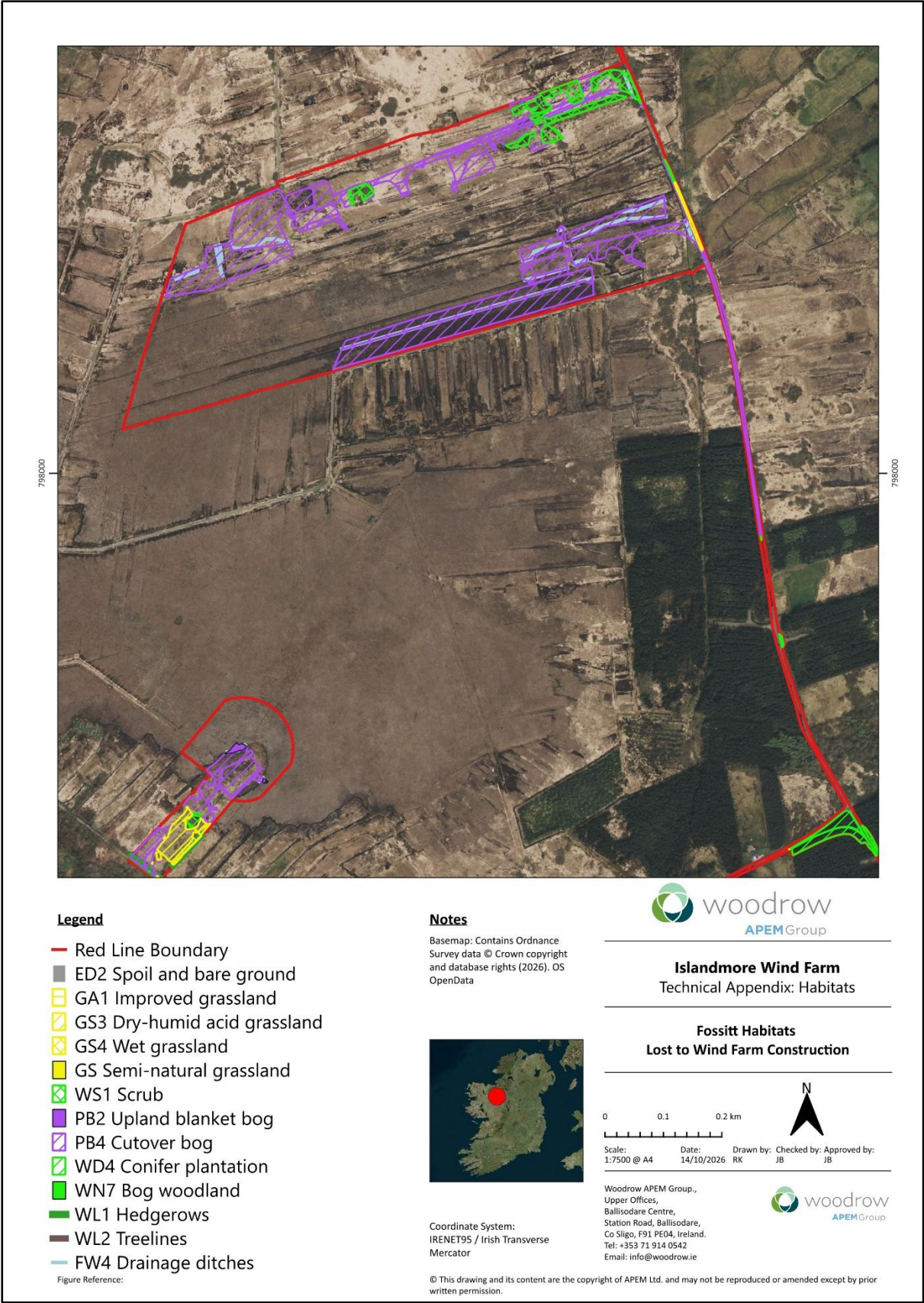


Figure 4: Fossitt habitats lost to wind farm construction

(FW4) Drainage ditch

In total, 14.99km of (FW4) Drainage ditch is located within the footprint of the development (including ditches on or immediately adjacent to the edge). The function of these ditches is to drain water from the peatland habitat to prepare it for harvesting. As such, the ditches have a negative effect on the integrity of the peatland habitats. An overall reduction in the number of drains within the (PB2) Upland blanket bog and (PB4) Cutover bog habitats, would have a net positive effect on these habitats.

Drainage ditches provide connectivity within the landscape for aquatic plants and animals. In particular, drainage ditches may provide habitat for amphibians such as common frog (*Rana temporaria*) and smooth newt (*Lissotriton vulgaris*). However, smooth newt have a preference for non-linear features and as such are less likely to be found in (FW4) Drainage ditches (O'Neill *et al.* 2004). Ditches also provide connectivity for otters (*Lutra lutra*) foraging across the project site.

(FW4) Drainage ditches located within peatlands can provide habitat for specialised aquatic plants such as lesser bladderwort, which was noted in the immediate vicinity (c. 100m) of T8.

Significance of effect on (FW4) Drainage ditches

The overall reduction in the coverage of (FW4) Drainage ditch across the project site as a result of the project will result in an indirect net positive effect on the integrity of the peatland habitat within the immediate vicinity (c. 30m) of the construction interventions including drain blocking. This will have a positive effect, the significance of which will vary depending on the specific habitat in which the (FW4) Drainage ditch is located, namely:-

- National importance where works are carried out on active (PB2) Upland blanket bog;
- County importance where works are carried out on inactive (PB2) Upland blanket bog;
- County importance where works are carried out on active (PB4) Cutover bog; and,
- Local (higher) importance where works are carried out on inactive (PB4) Cutover bog.

The permanent loss of (FW4) Drainage ditch habitat for aquatic and semi-aquatic flora and fauna is considered significant at a Local (higher) level for the connectivity it provides to species of *Local (higher) importance* such as common frog, smooth newt, and otter.

(PB2) Upland blanket bog

The project site supports 74.09ha of (PB2) Upland blanket bog, 51.41ha (c. 69%) was surveyed against Annex I criteria identifying 49.69ha that corresponds to Annex I habitat type 7130* Blanket bog (active). Of the habitat the 7130* Blanket bog (active), 26.81ha (52%) passes the monitoring stop criteria, while the remaining 22.88ha fails the monitoring stop criteria for Annex I habitat type 7130* Blanket bog (active). (PB2) Upland blanket bog was not assessed against Annex I criteria over 22.68ha (c. 31%)

as it occurs in areas that won't be directly impacted by the proposed wind farm development.

The direct loss of 2.63ha of active (PB2) Upland blanket bog is considered to be significant at a *National level*. In addition, these areas can also support the Annex I habitat type 7150 Depressions on peat substrates of the *Rhynchosporion*.

Construction within the immediate vicinity (c. 30m) of this habitat could also potentially have a significant negative indirect effect (as a result of drainage effects) on the hydrological integrity of the (PB2) Upland blanket bog over a further 1.97ha (within the project site boundary), 1.84ha of which was identified as the Annex I habitat type 7130* Blanket bog (active), the other 0.13ha was not assessed against Annex I assessment criteria. A further 0.44ha occurs outside of the site boundary.

Construction activities which lead to a lowering of the water table will make the habitat more susceptible to further threats such as encroaching scrub and the proliferation of non-native species. In addition, impaired hydrology will have impacts on the peatland flora and will likely result in the reduction the cover of bog-moss species overtime and with it the carbon storage potential of the habitat. The indirect loss of (PB2) Upland blanket bog as a result of the project therefore will likely extend for a further 30m, although this effect may not be immediate it will likely become evident through monitoring and botanical surveys conducted 5-10 years post-construction.

The indirect loss of habitat through degradation associated with the impaired hydrology of active (PB2) Upland blanket bog will likely have a significant negative effect at a *National level*.

The project site supports 22.88ha of active (PB2) Upland blanket bog which fail the Annex I monitoring stop criteria. Failure of a monitoring stop indicates multiple threats to the integrity of the habitat have been identified and as such the area within the immediate vicinity (c. 100m) of the monitoring stop is not considered to be a *viable area* of Annex I habitat. The loss of active (PB2) Upland blanket bog which fails the monitoring stop criteria, whether direct or indirect, will likely have a significant negative effect at a *County level*.

A further 1.72ha of inactive (PB2) Upland blanket bog was identified in an area of former forestry which retains the associated drainage channels and where secondary growth of non-native trees (lodgepole pine and sitka spruce (*Picea sitchensis*)) has taken place. There will be a direct loss of 0.10ha of inactive (PB2) Upland blanket bog is considered to be significant at a *County level*.

Dust deposition associated with construction activities, such as the pouring of concrete, have potential to negatively impact sensitive peatland flora within the local vicinity of the project. Environmental factors such as wind speed and humidity will largely determine the dust travel distance. Under moderate conditions it is likely dust deposition will be localised. Peatland flora is dependent on a low nutrient environment. Dust from concrete can contain nutrients like calcium carbonate, which can raise the pH of substrates and disrupt the natural acidity of peatlands. This alteration can lead to reduced productivity and, over time, the decline of sensitive peatland flora as they are outcompeted by non-peatland species. Any potential impacts will likely be temporary as the vegetation will likely recover without further intervention necessary to re-establish baseline conditions. As such, these indirect impacts are not likely to be significant.

Significance of effect on (PB2) Upland blanket bog

The Project will have an overall negative effect on the (PB2) Upland blanket bog habitat across the project site, through the permanent direct and indirect effects, the significance of which will vary depending on the quality of the habitat lost, namely: -

- *National importance* for the direct/indirect loss of 1.57ha active (PB2) Upland blanket bog, which corresponds to the Annex I habitat type 7130* Blanket bog (active) and passes the monitoring stop criteria. This also includes 0.13ha of (PB2) Upland blanket bog not assessed against Annex I criteria but as a precautionary approach applied to the highest level of importance;
- *County importance* for the direct/indirect loss of 2.93ha active (PB2) Upland blanket bog, which corresponds to the Annex I habitat type 7130* Blanket bog (active) and fails the monitoring stop criteria; and,
- *County importance* for the direct/indirect loss of 0.10ha inactive (PB2) Upland blanket bog with potential affinity to Annex I habitat type 7130 Blanket bog (inactive) and which fails the monitoring stop criteria.

(PB4) Cutover bog

The project site supports 45.53ha of (PB4) Cutover bog, 41.23ha (c. 91%) was surveyed against Annex I criteria identifying 26.06ha that corresponds to Annex I habitat type 7130* Blanket bog (active). A further 14.54ha was classified as 7130 Blanket bog but was not considered to be active. The (PB4) The remaining 4.30ha of (PB4) Cutover bog not assessed against Annex I criteria occurs in areas that won't be directly impacted by the project. Cutover bog which will be directly lost as a result of the project supports a combination of inactive and active peat.

Monitoring stops at the active (PB4) Cutover bog largely fail, due to the number of threats to the integrity of the habitat as well as the severity of these threats. As such, the areas in the immediate vicinity (c. 100m) of these monitoring stops are not considered to be *viable areas* of Annex I habitat. As such, the active (PB4) Cutover bog is of *County importance*.

13.95ha of active (PB4) Cutover will be directly lost as a result of the project. The indirect impacts will extend of another 30m as the project works are expected to have a significant drying effect on the (PB4) Cutover habitat. Therefore, the indirect effect on the active (PB4) Cutover bog is estimated to be 8.40ha. 3.27ha of this was classified as Annex I habitat type 7130* Blanket bog (active), with 3.90ha 7130 Blanket bog (not active) and 1.23ha in areas not assessed against Annex I assessment criteria (but as a precautionary measure this should also be considered to be active). A further 13.05ha occurs outside of the site boundary but within 30m of construction works. The 30m buffer is taken from guidance on the assessment of indirect impacts from proposed developments on peatlands, which considers peatland within 30m of a drain to be "drained" (NatureScot, 2023).

The inactive (PB4) Cutover bog is of *Local (higher) importance*. It has been identified as maintaining habitat connectivity between features of higher ecological value, as well as buffering higher value habitat from the drying effects associated with drainage and peat extraction. However, inactive (PB4) Cutover bog has lost "*a significant area of vegetation that is normally peat forming*" (European Commission, 2007: 84). This mainly refers to bog-mosses but also includes cottongrasses, black bog-rush

(*Schoenus nigricans*), purple moor-grass and woolly fringe-moss (*Racomitrium lanuginosum*) (Perrin et al., 2014:42).

The direct loss of 5.86ha inactive (PB4) Cutover bog will likely occur as a result of the project. None of this habitat occurred within the 30m hydrological impact buffer. .

As previously mentioned, the Fossitt (2000) habitat type (PB4) Cutover bog encompasses several Annex I habitat types including; 7130* Blanket bog (active), 7130 Blanket bog (inactive), 4010 Northern Atlantic wet heaths with *Erica tetralix*.

A small portion (0.63ha) of the (PB4) Cutover bog corresponds to the Annex I habitat type 4010 Northern Atlantic wet heaths with *Erica tetralix*. This is because the original peat mass has been removed and <0.5m of peat remains. Three of the four monitoring stops (T05v, T10iv, T10vii) within the habitat were identified as inactive. Only one monitoring stop within the habitat was identified as active (T10vi). Each of these monitoring stops fail the assessment criteria. The indirect loss of (PB4) Cutover bog corresponds to the Annex I habitat type 4010 Northern Atlantic wet heaths with *Erica tetralix* is expected to extend a further 30m and as such, is estimated to be c. 0.22ha.

Dust deposition associated with construction activities, such as the pouring of concrete, have potential to negatively impact sensitive peatland flora within the immediate vicinity of the project. Environmental factors such as wind speed and humidity will largely determine the dust travel distance. Under moderate conditions it is likely dust deposition will be localised. Peatland flora is dependent on a low nutrient environment. Dust from concrete can contain nutrients like calcium carbonate, which can raise the pH of substrates and disrupt the natural acidity of peatlands. This alteration can lead to reduced productivity and, over time, the decline of sensitive peatland flora. Any potential impacts are will likely be temporary as the vegetation will likely recover without further intervention necessary to re-establish baseline conditions. These indirect impacts are not likely to be significant.

Significance of effect on (PB4) Cutover bog

The project will have an overall negative effect on the (PB4) Cutover bog habitat across the project site, through permanent direct and indirect effects, the significance of which will vary depending on the quality of the habitat lost, namely:-

- *County importance* for the direct/indirect loss of 18.45 ha of active (PB4) Cutover bog, which aligns with the Annex I habitat type 7130* Blanket bog (active). All monitoring stops located within active (PB4) Cutover bog are assessed as of *County importance*, regardless of whether they pass or fail the assessment criteria;
- *Local (higher) importance* for the direct/indirect loss of 9.76ha inactive (PB4) Cutover bog which aligns with the Annex I habitat type 7130 Blanket bog (inactive) and fails the monitoring stop criteria; and,
- *Local (higher) importance* for the direct/indirect loss of 0.62ha Annex I habitat type 4010 Northern Atlantic wet heaths with *Erica tetralix* and fails the monitoring stop criteria.

(WN7) Bog woodland

A small parcel of (WN7) Bog woodland is located along the existing unnamed road to the south of T10. The (WN7) Bog woodland does not align with the Annex I habitat

Type 91D0* Bog woodland as it is not located on intact bog (it has formed on cutover bog). No bog-mosses were recorded in the understory, and the threshold for bog-moss cover is >25% to meet the classification criteria for Annex I Habitat Type 91D0* Bog woodland (Cross and Lynn, 2013).

A portion of the (WN7) Bog woodland (21m²) will be lost as a result of road widening works for the proposed access track to T10. This would result in the direct loss of habitat. The likely significant indirect effects include the spread of invasive species a large thicket of the invasive not native species cherry laurel, which was identified in the understory of the (WN7) Bog woodland.

Dust deposition associated with construction activities, are not likely to have a significant effect on the flora of the (WN7) Bog woodland.

Significance of effect on (WN7) Bog woodland

The project will have an overall negative effect on the (WN7) Bog woodland identified within the project site. The significance of the effect is considered to be of:-

- *Local (higher) importance* for the direct loss (<0.01ha) of (WN7) Bog woodland; and,
- *Local (higher) importance* for the indirect spread of invasive species.

(WL1) Hedgerows

The (WL1) Hedgerows within the project site are limited in extent (1.71km) due to the upland nature of the project site. The majority of the direct habitat loss for (WL1) Hedgerows is associated with widening access for the turbine delivery to T6 and T10 and edge boundaries adjacent to project infrastructure at T10. In total there will be a loss of 460m in length during construction.

The loss of this linear feature will likely have significant effect on foraging/commuting/roosting passerine birds, foraging/commuting/roosting bats, large mammals such as badger (*Meles meles*) and foraging/commuting/resting sites for small mammals such as pygmy shrew (*Sorex minutus*), hedgehog (*Erinaceus europaeus*), and Irish hare (*Lepus timidus hibernicus*) at the Local level.

Dust deposition arising from construction traffic has the potential to negatively affect (WL1) Hedgerows as they often border roads and access tracks along which the construction traffic will pass. Dust deposition can disrupt photosynthetic process and lead to lower plant productivity. Hedgerow species tend to be woody, perennial and relatively tolerant of disturbance. As such, dust impacts on (WL1) Hedgerows are not likely to be significant and would be temporary. Environmental conditions will return to baseline in the short-term without further intervention.

Significance of effect on (WL1) Hedgerows

The direct loss of 460m of (WL1) Hedgerows as a result of the project will likely have a significant effect of *Local (higher) importance* for species which rely on these linear features for commuting, foraging, roosting/resting including birds, bats, and terrestrial mammals.

(WL2) Treelines

The only (WL2) Treelines habitat identified within the project site, are located in the immediate vicinity of (c. 50m) the bat roost identified in the building to the south-east of T06, and on the access track near T10. As such, this habitat is likely a significant feature for commuting and foraging bats. Furthermore, mature and semi-mature native trees are sparse within the surrounding upland habitats. The project will result in the loss of c. 5m of (WL2) Treeline near T10.

Significance of effect on (WL2) Treelines

The project will have an overall negative effect on the (WL2) Treeline habitat identified within the project site. The significance of the effect is considered to be of:-

- *Local (higher) importance* for the direct loss of c. 5m of Treeline (WL2).

(WS1) Scrub

The (WS1) Scrub habitat is a frequent component of the (PB4) Cutover bog habitat, as well as artificially drained (PB2) Blanket bog. The parcels of (WL1) Scrub were largely unmapped as they fall below the minimum threshold for mappable features (c. 50m²). As such, the overall extent of this habitat within the project site and the calculation estimating habitat loss will be an underestimate.

While Scrub habitat (WS1) is listed as a negative indicator for EU Annex I habitat type 7130* Blanket bog (active) and its removal within that habitat type, therefore, could have a direct positive impact on the status of the (PB4) Cutover bog in some instances, the need for this should be assessed on a site by site basis during the pre-construction surveys and agreed with the appointed Ecological Clerk of Works (ECoW). The indirect effects of the loss of (WS1) Scrub from across the project site would include a likely loss of foodplant and shelter for invertebrates, resting places for terrestrial mammals, as well as likely loss of breeding, roosting, and foraging area for bird species.

Significance of the effect on (WS1) Scrub

The project will have an overall negative effect on the (WS1) Scrub habitat identified across the project site. The significance of the effect is considered to be of:-

- *Local (higher) importance* for the direct loss of (WS1) Scrub (c. 1.29ha); and,
- *Local (higher) importance* for the indirect impacts on local populations of invertebrates, terrestrial mammals and passerine birds.

5.5.4.3 Terrestrial (non-volant) Mammals

Based on habitat availability and/or occurrence within the project site, three species of protected mammal were considered as important ecological features; including: otter, badger and pine marten. Although potential evidence of red squirrel was recorded within the project site, no evidence of populations of squirrel being significant at more than a local level were recorded.

Direct impacts on mammals during construction relate to impacts on resting sites, where young or resting animals can be killed or injured; as well as the potential for entrapment within excavations etc. In some instances construction activities can result in the destruction of a resting site e.g. burrows, layups or roosting sites.

Tree/vegetation removal impacts arboreal species (e.g. red squirrel), while ground works such excavation or pile driving can impact burrowing species (e.g. badgers).

Badger

Badger is the only mammal species identified as an important ecological feature where confirmed active resting sites were identified within the Zol of the proposed works corridor.

Two active badger setts were identified during field surveys. A sett was located c. 17m to from the site boundary and c. 90m from a construction compound. An outlier sett was located near an access track approximately 2m from the project and approx. 15m from an access track (See **Confidential Annex 5.5.**). A trail camera was deployed and confirmed it as an active sett. Pre-construction surveys will be required to ascertain activity levels of all badger setts prior to works commencing.

In the absence of mitigation, potential direct impacts on badger setts are considered to be Significant at the Local (higher) level.

Suitable foraging habitat for badger will be temporarily lost resulting from the works corridor and infrastructure locations during the construction phase. Construction of the infrastructural footprint will result in the loss of potential foraging, commuting and sheltering habitat utilised by badgers. In this instance removal of trees, may 'open up' new foraging opportunities to badgers and considering the substantial foraging habitat available to badger across the wider area, any minimal temporary loss of foraging resource is not considered to result in a likely significant effect on badger.

Temporary artificial lighting at construction compounds may also alter badger behaviour at these locations. Across the wider area, there is substantial foraging and commuting habitat available to badger and, as such, no likely significant effects are predicted arising from artificial lighting impacts on badger at any geographical scale.

Disturbance from noise, vibration and movement of machinery and operatives has the potential to displace foraging individuals or, typically of more concern, causing breeding mammals to abandon natal sites. In terms of secondary impacts to mammals during construction, the main cause for concern is disturbance to breeding badgers, which were judged to have a potential breeding sett c. 175m from the project footprint (See **Confidential Annex 5.5.**). As set out by NRA (2006) guidelines, to avoid disturbance during the breeding season (December to June) where possible, works should not occur within 50m of an active sett, and no blasting or pile driving should occur within 150m of an active sett. If this is not possible, a Method Statement for works shall be drafted by the appointed ECoW and agreed with the Local Authority and the local NPWS ranger prior to the works commencing within affected areas (see **Section 5.6.1.4**).

Secondary impacts resulting from potential disturbance to a badger maternity sett during construction are considered significant at the Local (higher) level.

Otter

Two suspected holts were recorded during field surveys. The first suspected holt (Holt 1) was located approximately 20m from the project and the second suspected holt (Holt 2) was located approximately 103m from the project (See **Confidential Annex 5.5.**). As set out by NRA (2008) guidelines, to avoid disturbance, works should not occur

within 150m of any holts at which breeding females or cubs are present. No wheeled or tracked vehicles (of any kind) should be used within 20m of active, but non-breeding, otter holts.

In the absence of mitigation, potential direct impacts on otter holts are considered to be Significant at an international scale; Otters potentially displaced from the project site could relocate to the River Moy SAC and compete for resources with otter populations utilising the SAC.

Temporary in-stream works at watercourse crossings may affect prey availability and movement of otter. While there is ample suitable habitat for otter in the wider area, water quality impacts or an accidental pollution event arising from the construction of the project at any of the watercourse crossings could result in a likely significant effect on otter.

Artificial lighting and noise impacts at the project, and at watercourse crossings, could affect behaviour of crepuscular species such as otter using the adjacent area. In the absence of mitigation measures, disturbance and displacement effects are expected to result in a significant effect on otter.

In the absence of mitigation, secondary impacts resulting from deterioration in water quality during construction are considered to have the potential for significant effects at the international level for otter as there is potential overlap between foraging otters utilising the project site and populations inhabiting the River Moy SAC. Otters potentially displaced from the project site could relocate foraging activities to the SAC and compete for resources with otter populations utilising the SAC.

Pine marten

Evidence of pine marten foraging in the area was noted on the project site; however, no pine marten dens were identified within the footprint of the works. Therefore, no potential for direct impacts were identified for this species. Construction of the project will result in the loss of potential foraging, commuting and sheltering habitat utilised by mammals. In this instance removal of trees, is likely to reduce habitat availability for arboreal species like pine marten.

Disturbance from noise, vibration and movement of machinery and operatives has the potential to displace foraging individuals or, typically of more concern, causing breeding mammals to abandon natal sites. Disturbance from construction activities is considered unlikely to impact on foraging pine marten; as this species hunts over a large area and the surrounding area contains a large amount of similar foraging habitat that may be used, if construction noise causes certain areas to be avoided. No pine marten dens were located during surveys, and the species was not considered to have breeding sites within the zone of influence where disturbance would have the potential for significant effects (i.e. 100m for pine marten as recommended in VWT, 2015).

For pine marten, any indirect impacts resulting from habitat alteration and associated disturbance during construction are considered to have not effects at a Local (higher) level.

Red squirrel

No red squirrel dreys were identified within the redline boundary. There is one record for this species within the 10km grid square from 2001 (Carey, *et al.* 2007). Feeding signs were recorded during the surveys and it is anticipated that the project site has the potential to support foraging red squirrel.

Given the lack of red squirrel activity across the majority of the project site, any indirect impacts resulting from habitat alteration and associated disturbance during construction are considered to be significant effects at the Local (higher) level only, and sufficient alternative habitat remains available to any local red squirrel population in the wider environs of the project site.

Other mammals

The project site provides suitable supporting habitat for small mammals such as pygmy shrew, hedgehog and Irish hare. Temporary vegetation removal is likely to result in a temporary impact; however, this is not predicted to be significant at any geographical scale given the suitable surrounding habitat that will accommodate any displaced individuals during the construction phase.

There will be no likely significant effect at any geographical scale on small mammals as a result of the project.

5.5.4.4 Bats

No confirmed bat roosts will be directly impacted by the project. The confirmed roost identified within the derelict dwelling will remain in situ and will not require demolition, modification or direct disturbance.

No works are proposed within identified Potential Roost Features (PRFs). However, construction activities will require localised vegetation clearance and access creation, resulting in the loss of some bat foraging and commuting habitat.

The most notable habitat losses are associated with turbines T2 and T3, where tree felling within commercial conifer plantations will be required. Both locations support habitat of moderate suitability for bat foraging and commuting, and moderate levels of bat activity were recorded during surveys. Nevertheless, no confirmed roosts or PRFs of moderate or higher suitability were recorded within 300 m of either turbine location. Given the limited extent of habitat loss and the availability of similar habitat within the wider landscape, impacts at T2 and T3 are considered likely to be low to moderate.

All other turbine locations are situated within open bog habitats of generally low suitability for bats. Habitat loss at these locations will be limited and is expected to result in negligible to low effects on local bat populations.

The confirmed roost will not be directly affected by the development. However, the significance of any indirect effects arising from the removal of nearby linear features will be assessed once the final extent of vegetation clearance has been confirmed. Should habitat removal affect features used by bats for commuting between the roost and surrounding foraging habitat, appropriate mitigation measures will be implemented to maintain ecological connectivity.

Foraging and commuting bats

Potential disturbance to foraging and commuting bats from artificial lighting was considered as part of the assessment. Night-time construction activities will be limited to the turbine erection phase, which is expected to require approximately one night per turbine. As a result, any lighting-related disturbance will be temporary and localised. All other construction activities will be undertaken during daylight hours, and no permanent construction lighting is proposed.

The species most frequently recorded during baseline surveys, namely common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*) and Leisler's bat (*Nyctalus leisleri*), are generally considered less sensitive to artificial lighting than brown long-eared bat (*Plecotus auritus*) and *Myotis* species, both of which were recorded at low levels across the project site. Consequently, the significance of lighting-related disturbance is low and temporary.

The principal impact on foraging and commuting bats relates to habitat loss and fragmentation associated with vegetation clearance. Habitat removal will be concentrated at locations where access provision, turbine hardstands and associated infrastructure require the removal of woodland or linear habitat features. These include:-

- Turbine T2 (D.02): Removal of conifer plantation habitat associated with turbine infrastructure and crane hardstanding.
- Turbine T3 (D.03): Removal of plantation edge habitat and associated woodland connectivity features.
- Confirmed roost area: Potential removal of approximately 30 m of linear habitat features (WL1 and/or WL2), subject to detailed design confirmation.
- Access routes and infrastructure corridors: Localised trimming or removal of sections of hedgerow, scrub and treeline vegetation where required to facilitate construction access.

The most ecologically significant habitat losses are associated with T2 and T3, where moderate levels of bat activity were recorded and woodland habitat provides a degree of connectivity and foraging opportunity. However, no confirmed roosts or Potential Roost Features of moderate or high suitability were identified within 300 m of either location, or extensive areas of comparable plantation habitat remain available within the wider landscape.

The potential removal of sections of WL1 and/or WL2 represents the primary pathway by which commuting habitat associated with the confirmed roost could be affected. Subject to confirmation of the final layout, habitat loss will be minimised through detailed design, and connectivity between the roost and surrounding foraging habitat will be maintained through appropriate mitigation measures.

In the absence of mitigation, the loss of woodland edge habitat, localised removal of linear landscape features, and temporary construction disturbance could result in a moderate adverse effect at the local level on foraging and commuting bats. Following the implementation of mitigation measures, including minimisation of habitat loss, retention of linear features where practicable, habitat reinstatement and sensitive lighting design, the residual effect is predicted to be slight adverse and not significant.

5.5.4.5 Birds

Curlew

Medium-term impacts (15-18 months) on curlew may include temporary disturbance associated with construction activities. Curlew were infrequently recorded within the project site and were predominantly observed flying through the area, with only a single instance of birds landing to rest. Given the availability of extensive alternative habitat in the surrounding landscape and the limited use made of the project site, any disturbance-related displacement would be temporary and negligible. Consequently, no significant effect is predicted at any geographic scale.

Permanent habitat loss associated with turbine foundations, hardstanding areas, access tracks, underground cabling, the electrical substation and other associated infrastructure would result in the loss of a small area of habitat within the project site. However, given the very limited use of the project site by curlew and the absence of evidence that birds are reliant on habitats within the project site for foraging, roosting or breeding, the loss of habitat is not considered significant. No significant effect is predicted at any geographic scale.

Golden plover

Medium-term construction impacts (15-18 months) may include disturbance and temporary displacement of non-breeding golden plover from the project site and immediately surrounding habitats. Golden plover were recorded regularly during the non-breeding season, utilising the project site for flight activity, resting and occasional feeding. Based on Goodship and Furness (2022), disturbance effects may extend up to 500 m from active construction areas. Given the scale and duration of construction activities, golden plover may temporarily avoid the project site and adjacent habitats, resulting in displacement to suitable habitat elsewhere within the wider landscape. Suitable alternative habitat is present within the wider area and the effect is therefore considered temporary and reversible. A significant effect is not predicted during construction.

Permanent habitat loss associated with turbine foundations, hardstanding areas, access tracks, underground cabling, the electrical substation and associated infrastructure would result in the loss of habitat used by golden plover for occasional feeding and resting. Although this would reduce the availability of habitat within the project site, golden plover are highly mobile during the non-breeding season and utilise a wider network of habitats across the surrounding landscape. Suitable alternative habitat remains available within the wider area and the habitat lost represents a small proportion of the available resource. Therefore, whilst an adverse effect is predicted, it is not considered significant.

Hen harrier

As hen harrier was recorded frequently during baseline surveys, including records of roosting birds, there is the potential for impacts during the construction phase. Medium-term impacts (during the 15-18 month construction phase) include displacement of birds from winter roosting locations, disturbance to roosting/foraging birds during the construction activities on the project site. This includes temporary lighting impacts from construction compounds, noise from construction activities and an overall increase in human activity beyond the current baseline activity have the

potential to lead to displacement/abandonment of the winter roost location present to the west of the project site. Due to the confidential nature of roost locations, construction phase impacts on roosting birds are discussed in detail within **Annex 5.8**.

Permanent habitat loss for hen harrier over the lifespan of the project site (40 years) will result in loss of foraging habitat for non-breeding birds due to the permanent removal of existing habitat facilitating the installation of turbine foundations; turbine hardstanding's; internal site access tracks; internal wind farm underground cabling/grid connection; site entrances; on-site electricity substation, peat storage areas and all other associated site development/access within the project site.

No hen harrier breeding was recorded during baseline surveys, and while three roost areas were recorded, none were within the project site and, therefore, there will be no loss of roosts. Hen harrier was recorded regularly during baseline surveys with moderate flight activity and a total of 36 flights recorded during VP watches which are shown within **Annex 5.7**. Hen harrier flights were also recorded during Hen Harrier Roost Searches, flights recorded are shown in **Annex 5.8**.

Although there would be loss of foraging habitat within a small area within the project site, there is suitable foraging habitat present within and immediately adjacent to the project site, with additional suitable foraging habitat beyond the project site. Data collected and previous studies also indicate that during the non-breeding season hen harrier can be more transient, and as recorded during surveys will vary their roost locations and flight activity accordingly (O'Donoghue, 2020).

Considering the relatively small area within which birds would be displaced and low activity recorded within these areas, and the presence of suitable habitat surrounding roosts and beyond the project site, it is considered that impacts of habitat loss would be minor and not significant. The implementation of embedded mitigation will ensure that there are no significant construction phase disturbance/displacement effects on roosting hen harrier.

Kestrel

Medium-term impacts (approximately 15-18 months) may include disturbance associated with construction activities, resulting in a temporary reduction in the use of the project site by kestrel for hunting. Kestrel is generally tolerant of moderate levels of human activity and are frequently recorded in agricultural landscapes and other areas subject to regular disturbance. However, large-scale construction activities have the potential to reduce the suitability of habitats for foraging through increased levels of disturbance and temporary displacement of prey species. Given the regular use of the project site by kestrel for hunting, a significant effect is predicted at the local geographic scale during construction.

Permanent habitat loss associated with turbine foundations, hardstanding areas, access tracks, underground cabling, the electrical substation and associated infrastructure would result in the loss of habitat used by kestrel for foraging. Kestrel were regularly recorded within the project site, with hunting representing the principal behaviour observed during surveys. The permanent loss of habitat would therefore reduce foraging opportunities available within the project site. However, suitable foraging habitat remains available within the wider landscape and kestrel are capable of exploiting a broad range of habitats. Consequently, although an adverse

effect is predicted, the loss of habitat is not considered significant at any geographic scale.

Lesser black-backed gull

Medium-term impacts (approximately 15-18 months) may include disturbance associated with construction activities, which could lead to reduced use of the project site for flight activity and foraging. Lesser black-backed gull was recorded regularly within the project site, although observations typically comprised small numbers of birds transiting through or foraging opportunistically. The species is not reliant on the project site for movement through the wider landscape and alternative flight routes are readily available. Furthermore, extensive suitable foraging habitat is present within the wider area. Consequently, any changes in use of the project site during construction would be temporary and reversible, and no significant effect is predicted at any geographic scale.

Permanent habitat loss associated with turbine foundations, hardstanding areas, access tracks, underground cabling, the electrical substation and associated infrastructure would result in the loss of a small area of habitat that may be used opportunistically by lesser black-backed gull for foraging. Lesser black-backed gull was recorded regularly within the project site; however, observations typically comprised small numbers of birds and there was no evidence of breeding activity or reliance on site habitats. Extensive suitable foraging habitat remains available within the wider landscape and the habitat permanently lost represents a negligible proportion of the habitat resource available to the species. Consequently, although an adverse effect is predicted, the loss of habitat is not considered significant at any geographic scale.

Merlin

Medium-term impacts (approximately 15-18 months) may include disturbance associated with construction activities, resulting in a temporary reduction in the use of the project site by merlin for hunting and transit movements. Merlin was recorded only sporadically throughout the survey period and no breeding territories were identified within the project site or wider study area. The species is considered to utilise the project site opportunistically in response to prey availability, with extensive alternative foraging habitat available within the wider landscape. Consequently, any reduction in site use would be temporary and reversible and no significant effect is predicted at any geographic scale.

Permanent habitat loss associated with turbine foundations, hardstanding areas, access tracks, underground cabling, the electrical substation and associated infrastructure would result in the loss of a small area of habitat that may be used by merlin for opportunistic hunting. Merlin was recorded only sporadically during surveys and no breeding territories were identified within the project site or wider study area. The species is considered to utilise the project site intermittently in response to prey availability, with extensive alternative foraging habitat remaining available within the wider landscape. Consequently, although an adverse effect is predicted, the loss of habitat is not considered significant at any geographic scale.

Red grouse

Medium-term impacts (15-18 months) include disturbance during construction activities that may lead to reduced use of the project site for breeding, feeding and resting. Red grouse are secretive in nature and are likely to avoid active construction areas. There are no published disturbance distances for red grouse; however, Goodship and Furness (2022) identify an upper disturbance distance of 150m for black grouse. Given the ecological similarities between the two species, a disturbance distance of up to 150m is considered a reasonable precautionary assumption. Temporary displacement from habitats close to construction activities is therefore likely during the construction period.

Permanent habitat loss associated with access tracks, turbine foundations, hardstanding areas and associated infrastructure would result in the loss and fragmentation of suitable habitat used by red grouse. This is particularly relevant given the species' sedentary nature, restricted distribution in Ireland and reliance on suitable moorland habitats.

Small numbers of red grouse were present during the non-breeding season (a peak of three birds) and although no breeding birds were identified, red grouse territories are difficult to identify due to their secretive nature and using the precautionary principle based on data recorded it has been assumed that 1-2 pairs could breed within the survey area.

Habitat loss will cover a relatively small area, and there is suitable alternative habitat available to support breeding and wintering birds within and adjacent to the project site. Embedded mitigation will ensure that buffers are implemented around any breeding birds to ensure no disturbance or displacement effects. The disturbance distance for this species is small, and it is considered that there is suitable habitat to accommodate breeding birds which are displaced.

Therefore, construction phase impacts are considered not significant at any geographic scale.

Snipe

Medium-term construction activities (approximately 15-18 months) have the potential to displace breeding snipe from suitable habitat within the project site. Three breeding territories were identified during surveys in 2020 and 2021, including two territories located within approximately 100 m of proposed infrastructure in the southern part of the project site. Although breeding was not confirmed during 2022 and 2023, suitable habitat remains present and the assessment adopts a precautionary approach based on the previous breeding records. There is no published disturbance distance for snipe within current guidance (Goodship and Furness, 2022). However, given the species' secretive nature and sensitivity to disturbance during the breeding season, construction activities have the potential to displace breeding birds from suitable habitat within 100m of works, using professional judgement. A precautionary approach has been adopted in the assessment.

Permanent habitat loss and degradation are likely as a result of drainage and hydrological modification required to facilitate construction. Snipe favour wet areas for both feeding and breeding and are closely associated with waterlogged habitats. Alteration of peatland hydrology, habitat drying and changes to water flow patterns may reduce the suitability of existing breeding habitat within the project site.

Habitat loss will cover a relatively small area, and there is suitable alternative habitat available to support breeding and wintering birds within and adjacent to the project site. Embedded mitigation will ensure that buffers are implemented around any breeding birds to ensure no disturbance or displacement effects. The disturbance distance for this species is small, and it is considered that there is suitable habitat to accommodate breeding birds which are displaced.

Therefore, construction phase impacts are considered not significant at any geographic scale.

Swift

Swift utilise the project site only during the summer months, typically between April and August, when individuals undertake feeding flights as part of wider foraging movements across the landscape. Medium-term impacts (approximately 15-18 months) may include minor disturbance and temporary displacement arising from construction activities. However, given the highly mobile nature of the species and its extensive foraging range, it is unlikely that construction activities would result in any appreciable change in site use. Therefore, no significant effect is predicted at any geographic scale.

Woodcock

Medium-term impacts (approximately 15-18 months) may include disturbance associated with construction activities, resulting in a temporary reduction in the use of the project site by wintering woodcock. A single woodcock was recorded during surveys; however, woodcock is a highly cryptic species that is frequently under-recorded during standard daylight survey methods. The project site contains suitable wintering habitat, and it is considered likely that additional individuals may utilise the project site during the non-breeding season.

Permanent habitat loss associated with turbine foundations, hardstanding areas, access tracks, underground cabling, the electrical substation and associated infrastructure would result in the loss of a small area of habitat potentially suitable for wintering woodcock. This may reduce the availability of feeding and resting habitat within the project site. However, suitable habitat remains available elsewhere within the wider landscape.

Given the limited evidence of site use, the availability of alternative habitat and the temporary nature of construction disturbance, no significant effect is predicted at any geographic scale.

5.5.4.6 Freshwater Ecology

The project could cause direct damage to the rivers through construction adjacent to or over the channel. The riverbed habitat could be damaged if any machinery enters the water or the works cause bank erosion, in addition to the risk of increased sediment runoff. Most construction will incorporate a minimum 50m buffer along watercourses. Any proposed river crossings associated with access tracks will be carefully managed to ensure no runoff or accidental entry into the channel.

The rivers in the project site are of local importance to fish. Therefore, disturbance in the absence of mitigation is considered to be temporary for the duration of construction and significant at the at a local (higher) level.

Disruption of the natural hydrological processes in the peat habitats on the project site may increase the frequency or water velocity of high flow events, which could potentially scour and wash away bed sediments, and displace animals downstream. Increased runoff also furthers erosion from the catchment and thus sedimentation and nutrient input.

Construction processes including clearing vegetation and woodland, track construction, excavation for cables and infrastructure, and change to drainage systems can lead to sediment and nutrient release into adjacent watercourses in the absence of mitigation. An important pathway for nutrient enrichment is where cleared vegetation (including brash and roots from felled trees) is left to decay, and nutrients released by the decomposition process are carried by runoff channels into adjacent water courses. Bog drainage in upland regions of river catchments can cause large quantities of peat silt to be deposited into the river. Peat silt is very fine and mobile and can be spread long distances downstream. This peat silt is able to fill the smallest interstices. Large scale drainage of upland peat bog changes the flow regime within an impacted river system, causing further erosion to the bank and within the river, thus causing more siltation.

Riverbank erosion resulting from the removal of vegetation, the introduction of invasive species or entering or working nearby a river, causes eroded banks to fall into the water course, reducing the substrate to silt by the force of the current and are deposited downstream. Eroded banks are then unstable and are prone to further erosion by the same causes and during times of spate or changes in flow. Sediment runoff is exacerbated in peat rich areas with steep slopes.

Heavy machinery and vehicles on site can cause soil disturbance and compaction, creating pathways for rapid and erratic movements of water movement, leading to siltation in the watercourse.

Construction of tracks in the catchment area can act as a pathway for pollutants to enter the surrounding waters. Threats of pollutants during the various stages of the development of a windfarm include stockpiling of materials and the presence of machinery and vehicles, with the potential for fuel or chemical spillage.

Flow changes and contamination by sediment, nutrients and pollutants will be propagated downstream and will enter the Owengarve downstream, where they will have a measurable negative effect on FPM, crayfish, salmonid and lamprey habitat and therefore on the populations in the River Moy SAC. As these populations are of international importance, disturbance in the absence of mitigation is considered to be temporary for the duration of construction and significant at an international level.

For downstream aquatic fauna in the Lung River, including white-clawed crayfish secondary effects during the construction phase are considered to have the potential to be Significant at the Local (higher) scale.

5.5.4.7 Amphibians and Reptiles

The construction phase of the project will result in the direct loss of suitable habitat for common lizard (*Zootoca vivipara*) and smooth newt (*Lissotriton vulgaris*). This habitat supports suitable features such as shallow pools, tussocky vegetation, and structurally diverse sward, providing both foraging, sheltering and breeding opportunities. However, extensive areas of similar quality habitat exist within the immediate surrounding landscape, including adjacent peatland. These areas are connected

and accessible, allowing for natural dispersal and recolonisation. As such, direct effects are considered not significant at a Local (higher) level and include:-

- Direct mortality of common lizard and smooth newt from the use of heavy machinery during construction; and,
- Direct loss of suitable habitat for breeding, sheltering, and foraging.

The indirect effects associate with construction activities are considered not significant at a Local (higher) level. Construction activities such as vegetation clearance, soil stripping, and machinery movement may cause indirect effects such as:-

- Disturbance or displacement of individuals during active periods (spring to autumn).

Even in the absence of mitigation, due to the habitats found on site, the project will likely not have a significant impact on the local population of common lizard and smooth newt.

5.5.4.8 Invertebrates

Construction of the project, specifically the access track to T10, could result in the permanent loss of marsh fritillary (*Euphydryas aurinia*) identified within the project site. In addition, the majority of the suitable marsh fritillary habitat in the immediate vicinity will be permanently lost including key larval foodplants (*Succisa pratensis*), suitable sward structure, and microclimatic conditions essential for successful development and pupation.

In the absence of mitigation, these direct and indirect impacts on marsh fritillary constitute a significant negative effect at a *County level*, as the species is undergoing a decline in quality and/or extent at a national level. As a species listed on Annex II of the EU Habitats Directive, it is afforded strict legal protection only within the SACs where it is listed as a Qualifying Interest in Ireland.

Direct impacts on marsh fritillary from construction include:-

- Direct mortality of larval webs present at the time of works; and,
- Direct loss of breeding habitat through construction.

Indirect impacts on marsh fritillary from construction include:

- Disturbance and displacement of adult butterflies through groundworks and vegetation clearance, with no alternative suitable habitat in the immediate vicinity of sufficient quality to support colonisation; and,
- Fragmentation of any remaining marginal habitat, further reducing the likelihood of natural re-colonisation post-construction.

Without mitigation, the construction phase will result in the likely loss of a local population of marsh fritillary butterfly, representing a net loss to the wider metapopulation structure in the region.

5.5.5 OPERATION PHASE

Operation phase impacts occur between the construction and decommission phases of the project, including operational turbines with turning blades and the

maintenance of built infrastructure. The proposed operational lifespan of the wind farm is 40 years.

Potential impacts during the operation phase encompass both direct and indirect impacts, which are summarised below.

Potential sources of impacts during the operation phase are:-

- Disturbance and displacement to fauna due to the presence of turbines;
- Disturbance and displacement to fauna due to operational maintenance works;
- Collision and barotrauma risk to bats from turbines;
- Collision risk to birds from turbines;
- Potential barrier effect on birds due to the presence of turbines;
- Collection and drainage of surface water from hardstanding areas;
- Surface water run-off containing suspended solids from exposed ground; and,
- Dust impacts arising from operational traffic.

As the wind farm's connection to the national grid is underground and avoids any notable sensitive habitats, once installed there will be no associated operation phase impacts. The electricity substation and underground electricity line will be subject to a separate planning application but has been assessed for cumulative assessment purposes.

5.5.5.1 Designated Sites

Natura 2000 & Internationally Designated Sites

Seven internationally designated sites were identified as being within the Zone of Influence of the project with potential for significant effects:

- Bellanagare Bog SPA [004105];
- Bricklieve Mountains and Keishcorran SAC [001656];
- Callow Bog SAC [000595];
- River Moy SAC [002298];
- Tullaghanrock Bog SAC [0002354];
- Lough Arrow SPA [004050]; and,
- Lough Gara SPA [004048].

Collision risk and disturbance impact to the Lough Gara SPA QI species are not anticipated. Whooper Swan was observed in such low numbers and at a higher flight height than the wind turbines that they did not qualify for CRM. Greenland white fronted goose was not observed on site, owing to limited suitable habitat.

Disturbance impacts on otters could also arise with increased human activity during maintenance operations and the use of artificial lighting. Due to the low number of maintenance workers required during normal maintenance operations, no significant impact will arise from operation phase disturbance (see NIS APEM Group Woodrow, 2026).

Site drainage infrastructure will continue to operate such that there will be no contaminated runoff which could affect downstream sites.

National Sites

Several national sites demonstrate a potential for collision risk and disturbance impacts to associated fauna, namely:-

- Feenagh and Bunnamuck Loughs pNHA;
- Lough Gara pNHA;
- Lough Glinn pNHA;
- Moylough Turlough pNHA; and,
- Quarryfield West Turlough pNHA.

These pNHAs are recognised for their wetland habitats and supporting waterbird populations. The project is likely to have a significant effect on these waterbird species, which face potential disturbance and collision risk during the operation phase of the project. In the absence of mitigation, the project is likely to have significant effects on the integrity of these sites of national importance during the construction phase.

5.5.5.2 Habitats

During the operation phase, no direct significant effects on habitats within or adjacent to the project are anticipated.

The direct loss of habitats under the operational footprint of the project, including the creation of buffers against turbulence and the continued maintenance of bat buffers have been considered fully under construction phase impacts (**Section 5.5.4**).

Indirect effects on habitats during the operation phase are generally the same as those discussed in the construction phase (**Section 5.5.4**).

There is potential for the project to impact locally on the water table having a sustained and significant drying effect on (PB2) Upland blanket bog and (PB4) Cutover bog habitats particularly within the immediate vicinity (c. 30m) of the project.

Issues related to ground water and surface waters are considered in more detail within **Chapter 7** of the EIAR.

Significance of Effects

The likely significant effects associated with the operation phase have already been considered under the construction phase (**Section 5.5.4**) and include the indirect effects on Annex I habitats of National, County importance, and local (higher) importance, namely:-

- National importance for the indirect effects on 1.97ha of active (PB2) Upland blanket bog, which aligns with the Annex I habitat type 7130* Blanket bog (active), and an additional 0.44ha of (PB2) Upland blanket bog outside of the project site;
- County importance for the indirect effects on 4.50ha of active (PB4) Cutover bog, which aligns with the Annex I habitat type 7130* Blanket bog (active)

and areas that were not subject to Annex I assessment, and an additional 13.05ha of (PB4) Cutover bog outside of the project site; and,

- Local (higher) importance for the indirect effects on 3.90ha of inactive (PB4) Cutover bog; and
- *Local (higher) importance* for the indirect effects on 0.22ha of (PB4) Cutover bog that corresponds to the Annex I habitat type 4010 Northern Atlantic wet heaths with *Erica tetralix*.

5.5.5.3 Terrestrial (non-volant) Mammals

Based on habitat availability and/or occurrence within the project site, three species of protected mammal were considered as important ecological features; including: otter, badger and pine marten. Although potential evidence of red squirrel was recorded within the project site, no evidence of populations of squirrel being significant at more than a local level was recorded. Inappropriately timed vegetation removal has the potential to directly impact on resting sites of burrowing and arboreal mammals, where young or resting animals can be killed or injured; although in some instance proposed activities may only result in the destruction of the resting site itself.

Overall, mammal species are generally considered tolerant of operational wind farms and no indirect impacts are expected to result from the operating turbines or servicing activities.

Badger

Two active badger setts were identified within the project site. There is a potential for direct impacts during the operation phase was identified for badgers.

Vegetation removal has the potential to have long-term displacement effects on certain species of mammals, due to loss of potential foraging, commuting and sheltering habitat. As discussed under construction impacts, removal of woodland may 'open up' new foraging opportunities to badgers.

Indirect impacts resulting from potential habitat alteration due vegetation removal are considered to have the potential for slight positive effects at the Local (higher) level for badger.

Otter

No otter holts were identified within the project site boundary. As both suspected otter holts were within 150m of the project site boundary, in the absence of mitigation, there is potential for direct impacts during the operation phase for otters.

In the absence of mitigation, potential deterioration in water quality within the drainage channels associated with the operational wind farm may result in reduced prey availability for otter both locally and downstream. As detailed in **Section 5.3.3.4**, if individuals noted as occasionally foraging in the project site are displaced from the area due to short-term disturbance, there is potential for increased pressure on resources within the downstream River Moy SAC.

In the absence of mitigation and applying the precautionary principal, indirect impacts resulting from deterioration in water quality due to tree felling are considered to have the potential for significant effects at the International level for otter.

Pine marten

No pine marten dens were identified within the project site. Therefore, no potential for direct impacts during the operation phase was identified for pine marten.

Vegetation removal required to implement bat feature buffers has the potential to have long-term displacement effects on certain species of mammals, due to loss of potential foraging, commuting and sheltering habitat. The exact area to be targeted for removal will be determined prior to construction. As discussed under construction impacts, removal of commercial forestry/woodland, is likely to reduce habitat availability for arboreal species like pine martin.

As outlined in **Section 5.3.3.4**, the zones of influence for pine marten breeding sites are 100m. The majority of habitats within the bat buffers/ tree felling areas, by virtue of being commercial plantations were considered as offering low-quality foraging and breeding habitats for mammals however, it is possible that pine marten could still utilise these areas.

For pine marten, potential indirect impacts resulting from habitat alteration during the creation of bat feature buffers are considered to have the potential for a significant negative effect at the Local (higher) level if breeding sites are disturbed. However, it is considered likely that pine marten would habituate to the wind farm over time, given extensive habitat availability in the wider environs.

Red squirrel

No red squirrel dreys were identified within the project site. Therefore, no potential for direct impacts during the operation phase was identified for red squirrel.

As outlined in **Section 5.3.3.4**, the zones of influence for red squirrel breeding sites are 50m. The majority of habitats within the bat buffers/ tree felling areas, by virtue of being commercial plantations were considered as offering low-quality foraging and breeding habitats for mammals, however, it is possible that red squirrel could still utilise these areas.

For red squirrel, potential indirect impacts resulting from habitat alteration during the creation of bat feature buffers are considered to have the potential for a significant negative effect at the Local (higher) level if breeding sites are disturbed. However, it is considered likely that red squirrel would habituate to the wind farm over time, given extensive habitat availability in the wider environs.

Other Mammals

No other mammal resting sites were identified within the project site. Therefore, no potential for direct impacts during the operation phase was identified for other mammals.

In the absence of mitigation, the removal of scrub habitat and coniferous plantation, similarly required during construction and to implement bat feature buffers, during the operation phase is considered to have the potential for a significant negative effect at the Local (higher) level upon terrestrial mammals which may be utilising these habitats for commuting and foraging purposes. However, it is considered likely that mammals would habituate to the wind farm over time, given extensive habitat availability in the wider environs.

5.5.5.4 Bats

Collision and Barotrauma risk

Direct turbine collision and barotrauma are recognised as potential causes of bat mortality at wind energy developments (Cryan & Barclay, 2009; Rydell *et al.*, 2010; Cryan *et al.*, 2014; Arnett *et al.*, 2016; Matthews *et al.*, 2016). Species considered to be at greatest risk within Ireland include Leisler's bat, common pipistrelle, soprano pipistrelle and Nathusius' pipistrelle (refer to **Table 29**).

Collision risk is typically influenced by both bat activity levels and the proximity of turbines to features that are used by bats for commuting and foraging. Research has demonstrated that turbines located close to woodland edges, tree lines, hedgerows, watercourses and other linear landscape features present a greater collision risk than turbines located within open habitats where bat activity is generally lower (Finch *et al.*, 2020). In addition, the creation of new forest edges through turbine-related forestry clearance may increase local bat activity by creating attractive foraging habitat.

Bat activity data were analysed using the statistical software R Version 4.6.1 (R Core Team, 2026). For each detector location and survey season, bat passes were standardised as bat passes per night and summarised using descriptive statistics. Mean and median activity values were calculated for each species and detector location to characterise spatial and temporal variation in bat activity across the project site. In accordance with NatureScot *et al.* (2021), mean activity values were used within the collision risk assessment as a precautionary estimate of bat activity, while median values were reviewed to assess the influence of unusually high activity nights on overall activity patterns. Full statistical outputs are presented in Annex 5.6.

The assessment followed the two-stage approach described in NatureScot *et al.* (2021), incorporating both site-specific habitat characteristics and recorded bat activity levels. Site risk was assessed based on the scale and characteristics of the proposed development, including the presence of 10 proposed turbines with turbine heights exceeding 100m and the proximity of other wind energy developments within the wider landscape (within 5km).

Based on these criteria, the proposed development was assigned a medium site-risk score (3). This score was combined with species-specific vulnerability scores adapted from Wray *et al.* (2010) to derive collision risk values for higher-risk species recorded on-site, namely Leisler's bat, common pipistrelle, soprano pipistrelle and Nathusius' pipistrelle.

Location-specific and season-specific risk scores were then generated using the assessment matrix presented in **Table 8**. Bat activity levels were classified in accordance with the thresholds provided in NatureScot *et al.* (2021).

Impact Assessment

The highest collision risk within the project area is associated with Turbines T2 and T3, where moderate levels of activity by higher-risk species, particularly Leisler's bat and common pipistrelle, were recorded in association with plantation habitat and woodland edge features. The requirement for forestry clearance at these locations may also create additional edge habitat that could attract foraging bats during operation.

The remaining turbine locations are situated predominantly within open bog habitats where bat activity was recorded at low levels throughout the survey period. Consequently, the inherent collision risk at these locations is considered lower.

In the absence of mitigation, operational impacts resulting from collision and barotrauma are predicted to result in a moderate adverse effect at the local level, principally affecting common pipistrelle and Leisler's bat. Following implementation of operational mitigation measures, including turbine curtailment during periods of elevated bat activity, residual effects are predicted to be slight adverse and not significant.

Direct turbine collision and barotrauma are extensively documented to cause major injuries and fatalities if no mitigation measures are put in place (e.g., Cryan & Barclay, 2009; Rydell *et al.*, 2010; Cryan *et al.*, 2014; Arnett *et al.*, 2016; Matthews *et al.*, 2016). The Irish bat species at risk are detailed in **Table 29**. Turbines installed in open habitat without any linear feature nearby will have lower potential for significant impacts due to collision and barotrauma due to the lower activity rate within these areas (Finch *et al.*, 2020). However, if turbines are located within proximity to linear features such as hedgerows, tree lines, and rivers/streams there is potential for a greater occurrence of bats within the turbine area, resulting in increased potential for bat fatalities and, therefore, significant direct impacts on bats (Finch *et al.*, 2020). As the proportion of fatalities attributed to direct collisions versus barotrauma can be difficult to determine the assessment in this section refers to both as collisions in line with the NatureScot *et al.* 2021 guidance.

Furthermore, the operation of turbines in locations such as dense conifer forests will require tree felling around the turbines to mitigate turbulence. This action creates new edge ecology and may attract bats.

Collision risk assessment

Bat activity data were analysed using R Version 4.6.1 (R Core Team, 2026). For each detector location and survey season, bat activity was standardised as bat passes per night and summarised using descriptive statistics. Mean and median activity values were calculated for each species and detector location to characterise spatial and temporal variation in bat activity across the project site. Full statistical outputs are presented in Annex 5.6.

Both mean and median activity values were generated; however, in accordance with NatureScot *et al.* (2021), mean activity values were used within the collision risk assessment as a precautionary estimate of activity, thereby reducing the influence of short-term fluctuations and ensuring that periods of elevated activity were captured within the assessment. Mean activity levels are presented in **Table 21**, while the complete statistical analysis is provided in Annex 5.6.

The collision risk assessment followed the two-stage approach described by NatureScot *et al.* (2021). The first stage involved assessing site-level risk based on habitat characteristics and development-related factors, including turbine number, turbine dimensions and the wider wind farm context. The second stage incorporated species-specific bat activity levels and species vulnerability to collision mortality.

The proposed development was assigned a medium site-risk score (3) based on the NatureScot methodology. This reflects the scale of the proposed development, comprising ten turbines with tip heights exceeding 100 m, together with the presence

of other wind energy developments within the wider landscape. The site-risk score was subsequently combined with species vulnerability scores derived from Wray *et al.* (2010) and Woodrow *et al.* (2018) for higher-risk species recorded during surveys, namely Leisler's bat (*Nyctalus leisleri*), common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*) and Nathusius' pipistrelle (*Pipistrellus nathusii*).

Location-specific and season-specific collision risk values were then calculated using the assessment matrix presented in **Table 9**. The resulting collision risk scores are presented in **Table 10**. Bat activity levels were classified in accordance with the activity thresholds set out in NatureScot *et al.* (2021).

Season	Location	Leisler's bat	Nathusius' pipistrelle	Common pipistrelle	Soprano pipistrelle
Spring	D.01	4	0	2	2
	D.02	6	0	2	2
	D.03	6	0	2	2
	D.04	4	0	2	2
	D.05	4	0	2	2
	D.06	4	0	2	2
	D.07	4	0	2	2
	D.08	4	0	2	2
	D.09	4	0	2	2
	D.10	4	0	6	2
	D.11	4	0	2	2
Summer	D.01	4	0	2	2
	D.02	4	0	2	2
	D.03	4	0	6	2
	D.04	4	0	2	2
	D.05	4	0	2	2
	D.06	4	0	2	2
	D.07	4	0	2	2
	D.08	4	0	2	2
	D.09	4	0	2	2
	D.10	4	0	2	2
	D.11	4	0	2	2
Autumn	D.01	4	0	2	2
	D.02	4	0	2	2
	D.03	4	0	2	2
	D.04	4	0	2	2
	D.05	4	0	2	2
	D.06	4	0	2	2
	D.07	4	0	2	2
	D.08	4	0	2	2
	D.09	4	0	2	2

Season	Location	Leisler's bat	Nathusius' pipistrelle	Common pipistrelle	Soprano pipistrelle
	D.10	4	0	2	2
	D.11	4	0	6	2

Table 29: Risk assessment value specific to species, location, and season using mean bat passes per hour

The outputs of the overall risk assessment are then considered in the context of collision impacts at the population level for species assessed having high population vulnerability **Table 29**, which in Irish context are Leisler's bat and Nathusius' pipistrelle.

Table 30 provides a summary of bat population vulnerability to wind farm impacts.

Species	Population vulnerability wind farms impacts	Overall activity levels	Site wide risk levels at for high collision risk spp.	Population Importance
Leisler's bat	High	Moderate/Low	8	Local (Higher) (10)
Nathusius' pipistrelle	High	Low	1	Local (1)
Soprano pipistrelle	High	Moderate/Low	7	Local (Higher) (10)
Common pipistrelle	High	Moderate/Low	7	Local (Higher) (10)
<i>Myotis</i> species	Low	Low	Low collision risk	Local (1)
Brown long-eared bat	Low	Low	Low collision risk	Local (1)

Table 30: Summary of collision risk impact assessment for the project

Both direct collision with turbine blades and barotrauma, defined as injuries to internal air cavities and blood vessels resulting from rapid changes in air pressure around rotating turbine blades, are recognised sources of bat mortality at wind energy developments (Cryan *et al.*, 2009; Rydell *et al.*, 2010). The vulnerability of Irish bat species to collision and barotrauma is summarised in **Table 30**, reflecting differences in flight behaviour, foraging ecology and the likelihood of individuals entering the rotor-swept area.

Collision risk is strongly influenced by the relationship between turbine locations and habitat features used by bats for commuting and foraging. Studies have demonstrated that bat activity is typically higher along woodland edges, treelines, hedgerows and watercourses than within open habitats. Consequently, turbines located in proximity to such features have a greater potential to interact with bats than turbines located within open landscapes.

Different bat species exhibit varying levels of susceptibility to collision risk. Pipistrelle species commonly utilise linear landscape features for commuting and foraging and may therefore be exposed to elevated risk where turbines are located near such habitats. In contrast, species such as Leisler's bat frequently forage over open habitats

and may be vulnerable to collision even where linear habitat features are absent. As a result, both habitat context and species-specific activity levels were considered in the assessment.

The likelihood of collision also varies temporally, with risk influenced by season, weather conditions, time of night and species behaviour. Consequently, site-specific activity data were used to identify periods and locations of elevated risk within the project site.

Based on the baseline survey results, the highest potential collision risk is associated with Turbines T2 and T3, where moderate levels of activity by higher-risk species, including Leisler's bat and common pipistrelle, were recorded in association with plantation and plantation-edge habitats. The remaining turbine locations are situated predominantly within open bog habitats where overall bat activity was low, and the likelihood of collision is correspondingly lower.

In the absence of mitigation, operational impacts arising from collision and barotrauma would persist throughout the operational lifetime of the proposed development (approximately 40 years). Given the presence of higher-risk species within the project area, together with moderate activity levels recorded at certain turbine locations, a potential moderate adverse effect at the local level cannot be excluded in the absence of mitigation.

Common pipistrelle and soprano pipistrelle

As outlined in **Table 34**, common pipistrelle (*Pipistrellus pipistrellus*) and soprano pipistrelle (*Pipistrellus pygmaeus*) are at high risk of collision and barotrauma at wind energy developments. This reflects their flight behaviour and their tendency to forage and commute within the rotor-swept zone, particularly in association with woodland edges, treelines, scrub and hedgerows. Both species may also forage over open habitats and at greater heights, increasing the potential for interaction with turbine blades.

Common pipistrelle is considered a habitat generalist, while soprano pipistrelle is more closely associated with wetland habitats and watercourses (Montgomery, 2002). Studies of bat fatalities at wind farms in Britain have identified both species among the bat species most frequently recorded during post-construction carcass searches, indicating a heightened susceptibility to operational impacts.

Both species are widespread and common throughout Ireland; however, their behavioural ecology results in a high vulnerability to collision and barotrauma. Consistent with the site-risk assessment and species vulnerability assessment presented in **Table 34**, common pipistrelle and soprano pipistrelle were assigned an overall high collision-risk rating for the proposed development.

Moderate activity levels of common pipistrelle were recorded at D.03, D.10 and D.11 during at least one survey season, while soprano pipistrelle activity remained low but widespread across the project site. Given the presence of suitable foraging and commuting habitat at some turbine locations, together with the species' susceptibility to turbine-related mortality, operational effects are predicted to occur in the absence of mitigation.

Therefore, in the absence of mitigation, collision and barotrauma are predicted to result in a significant adverse effect at the local (Higher) scale for both common pipistrelle and soprano pipistrelle.

Nathusius' pipistrelle

As outlined in **Table 34**, *Nathusius' pipistrelle* (*Pipistrellus nathusii*) is considered to be at high risk of injury or mortality from wind turbines through both collision and barotrauma due to its propensity to forage and commute in open habitats and at greater flight heights. The species is a strong flyer and is migratory across parts of its European range, during which individuals may undertake movements at considerable altitude. Rydell *et al.* (2010) reported that *Nathusius' pipistrelle* accounted for approximately 13% of documented bat fatalities at European wind energy developments.

Although the conservation status and population trends of *Nathusius' pipistrelle* in Ireland remain relatively poorly understood, records indicate that the species is being recorded with increasing frequency. This is likely attributable, at least in part, to increased survey effort and improvements in acoustic survey techniques.

Nathusius' pipistrelle was recorded infrequently within the project site, with low levels of activity detected at only three monitoring locations (D.04, D.06 and D.08) during the autumn survey period. Activity was limited to single bat passes, with only one night of confirmed activity recorded at D.04. The species was not detected during spring or summer surveys and was absent from all remaining detector locations.

Despite the species' inherently high susceptibility to turbine collision and barotrauma, the very low levels of recorded activity indicate limited use of the project site. Consequently, the overall collision risk for *Nathusius' pipistrelle* is assessed as very low on a site-wide basis (**Table 30**).

Therefore, in the absence of mitigation, operational effects arising from collision and barotrauma are predicted to result in a not significant effect at the Local (Higher) geographic scale for *Nathusius' pipistrelle*.

Leisler's bat

As outlined in **Table 34**, *Leisler's bat* (*Nyctalus leisleri*) is considered to be at high risk of collision and barotrauma at wind energy developments due to its flight behaviour and foraging ecology. The species is a strong and fast-flying aerial hawk that frequently forages and commutes in open habitats at heights that overlap with the rotor-swept area of modern wind turbines. Consequently, *Leisler's bat* is recognised as one of the bat species most vulnerable to turbine-related mortality in Ireland.

Although the closely related noctule bat *Nyctalus noctula*, which is frequently recorded during post-construction carcass searches at wind farms in Britain and continental Europe, does not occur in Ireland, its similar ecology indicates that *Leisler's bat* may be exposed to comparable collision risks where suitable habitat and flight conditions occur.

Based on the site-wide collision risk assessment (**Table 30**), *Leisler's bat* was assigned an overall collision risk of low to moderate. Activity was concentrated at detector locations D.02 and D.03 during the spring survey period, where moderate levels of activity were recorded. These locations correspond to Turbines T2 and T3 and are situated within or adjacent to conifer plantation habitat, approximately 25 m from

plantation edges. These areas represent the only substantial woodland habitat within the project site and provide suitable foraging and commuting opportunities for the species.

Given the recorded activity levels, the proximity of suitable woodland edge habitat, and the close spatial association between Turbines T2 and T3, there is an increased likelihood of Leisler's bat regularly utilising the airspace surrounding these turbines. Consequently, collision and barotrauma impacts are considered most likely to occur at these locations.

Therefore, in the absence of mitigation, operational impacts arising from collision and barotrauma are predicted to result in a significant adverse effect at the Local (Higher) geographic scale for Leisler's bat.

Myotis species

As outlined in **Table 34**, bats of the genus *Myotis* are considered to be at comparatively low risk of collision and barotrauma at wind energy developments due to their characteristic flight behaviour and foraging ecology. *Myotis* species typically forage within structurally complex habitats, such as woodland, scrub, hedgerows and other sheltered environments, and are rarely recorded flying at heights associated with the rotor-swept zone of modern wind turbines. Their short, broad wings and highly manoeuvrable flight characteristics further reduce their susceptibility to collision.

Evidence from post-construction monitoring studies undertaken at wind farms in the UK indicates that fatalities of *Myotis* bats are infrequent relative to higher-risk species such as pipistrelles and Leisler's bat. This is consistent with their tendency to forage close to vegetation and avoid open-air-space environments where collision risk is greatest.

During baseline surveys, *Myotis* species were recorded at low levels across the project site, with an overall total of 199 bat passes. Activity was dispersed and no locations supported consistently elevated levels of *Myotis* activity. In accordance with the species vulnerability assessment presented in **Table 34**, the three *Myotis* species regularly occurring in Ireland are considered to have a low vulnerability to wind farm developments.

Given the low levels of activity recorded, the limited use of open habitats by *Myotis* bats, and their low susceptibility to turbine collision and barotrauma, the operational collision risk associated with the proposed development is considered to be low.

Accordingly, in the absence of mitigation, operational effects on *Myotis* species are predicted to be slight and not significant at the local geographic scale.

Brown long-eared bat

As outlined in **Table 34**, brown long-eared bat (*Plecotus auritus*) is considered to have a low susceptibility to collision and barotrauma at wind energy developments. This reflects the species' characteristic flight behaviour and foraging ecology. Brown long-eared bats typically forage within woodland, hedgerows and other sheltered habitats, flying slowly and manoeuvring close to vegetation. Consequently, they are infrequently recorded flying within the rotor-swept zone of modern wind turbines.

Evidence from post-construction monitoring studies at wind farms in the UK indicates that fatalities of brown long-eared bat are rare relative to species considered at

higher risk, such as pipistrelles and Leisler's bat. This is consistent with the species' low propensity to forage in open airspace and its generally low exposure to operating turbines.

During baseline surveys, brown long-eared bat activity was recorded at low levels throughout the project site, with a total of 31 bat passes recorded across all monitoring locations. No locations supported elevated levels of activity, indicating that the site is used only occasionally for foraging or commuting purposes.

In accordance with the species vulnerability assessment presented in **Table 34**, brown long-eared bat is considered to have a low vulnerability to wind farm developments. Given the low levels of activity recorded, the species' preference for cluttered habitats and its low susceptibility to turbine collision and barotrauma, the operational collision risk associated with the proposed development is considered to be low.

Accordingly, in the absence of mitigation, operational effects on brown long-eared bat are predicted to be slight and not significant at the local geographic scale.

Lighting impacts

In accordance with EUROBATS guidance, artificial lighting should be avoided wherever possible and installed only where required for safety or regulatory purposes (Voigt *et al.*, 2018a). At wind energy developments, operational lighting is typically limited to aviation safety lighting mounted on turbine nacelles.

Operational turbines within the proposed development will be fitted with aviation warning lighting as required by aviation safety regulations. Aviation obstruction lighting is typically red in colour and has been identified as a potential attractant for certain bat species, particularly open-air foragers such as Leisler's bat (*Nyctalus leisleri*) and some pipistrelle species (Voigt *et al.*, 2018b). While red-spectrum lighting is generally considered less disruptive to bats than white or shorter-wavelength lighting (Spoelstra *et al.*, 2017), some attraction effects may still occur and could increase the likelihood of bats entering the rotor-swept area.

The proposed electricity substation will not be permanently illuminated during normal operation. Any lighting associated with the substation will be used only intermittently for maintenance, inspection or emergency purposes and is not expected to result in a measurable increase in disturbance to bats.

Given the relatively low levels of bat activity recorded across the majority of the site, together with the predominance of open bog habitat and the absence of significant bat commuting corridors within the immediate vicinity of most turbine locations, lighting-related impacts are expected to affect only a limited number of individuals. However, in the absence of mitigation, operational aviation lighting has the potential to increase collision risk for light-tolerant species, particularly common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*) and Leisler's bat.

Therefore, in the absence of mitigation, lighting-related operational effects are predicted to result in a moderate adverse effect at the local geographic scale, due principally to the potential for increased attraction to turbines and a consequent increase in collision risk.

5.5.5.5 Birds

Curlew

Collision Risk

CRM was undertaken for curlew and predicted 0.003 collisions per annum or 0.06 collisions per decade. When scaled to the 40-year operational life of the project, this equates to 0.24 collisions, which is less than a single predicted collision across the entire operational period.

Curlew were recorded infrequently during surveys and were predominantly observed transiting through the project site, with only a single observation of birds landing to rest. Given the very low predicted collision rate, limited use of the project site and the availability of extensive alternative habitat within the wider landscape, no significant effect is predicted during the operational phase at any geographic scale.

Golden plover

Collision Risk

Collision Risk Modelling (CRM) predicted 0.484 collisions annually or 4.84 collisions per decade for the V162 turbine scenario and 0.149 collisions annually or 1.49 collisions per decade for the V136 turbine scenario. Although these collision rates are amongst the highest predicted for any bird species recorded at the project site, they remain low in the context of the County-valued non-breeding population using the project site.

Golden plover are generally considered to be at low risk of turbine collision owing to their highly manoeuvrable flight behaviour and published studies have recorded very low levels of collision mortality at operational wind farms. An avoidance rate of 99.8% was applied within the CRM, consistent with current best practice (Gittings, 2020). It should also be noted that while a number of flights were recorded, a number of these were of flocks moving above potential collision height.

Assessment of the predicted mortality in the context of background mortality rates indicates that the additional mortality attributable to turbine collision would result in an increase substantially below the 1% threshold generally considered indicative of a significant population-level effect. Consequently, no significant effect arising from collision mortality is predicted at any geographic scale.

Displacement and barrier effect

Golden plover were recorded using the project site for feeding, resting and flight activity during the non-breeding season. Studies have reported avoidance distances of approximately 175 m from operational turbines (Hötter et al., 2006) while Goodship and Furness (2022) guidance suggests that although golden plover is sensitive to human disturbance, disturbance from operational turbines is relatively low and birds are potentially tolerant and will nest within 200m. This aligns with findings from Pearce-Higgins et al (2012) which states that golden plover exhibits reduced habitat usage within 200m of turbines.

Some reduction in use of areas immediately surrounding turbines may therefore occur, and using a precautionary approach, it is assumed that birds could be displaced

within 200m. Given the relatively small displacement distance, a large proportion of the bog habitats most readily used by golden plover (between T5, T6 and T7 and to the north-east of T1) would remain available to any foraging or loafing birds. This habitat is also connected to suitable bog habitats immediately adjacent. In addition, the layout of the project site means that there is no barrier to birds commuting to or from these areas. Numbers of birds recorded during VP surveys included occasional large flocks of 150-500 birds (on three days only) but more regularly fewer than 60 birds were recorded.

As suitable habitat would remain available within the project site beyond 200m from turbines and in the wider landscape, and golden plover are highly mobile during the non-breeding season golden plover are unlikely to be completely displaced from the project site. Consequently, any displacement or barrier effect is predicted to be minor and not significant at any geographic scale.

Hen harrier

Displacement and barrier effect

Impacts on hen harrier roosts are discussed in detail within **Annex 5.8** due to the confidential nature of these sites.

It is anticipated hen harriers will continue to use the project site, with some degree of turbine avoidance shown by hunting birds which could result in displacement of foraging birds.

In line with guidance from Pearce-Higgins (2009), there is potential for displacement of foraging birds within 250m of turbine locations in a worst-case scenario. It should be recognised that more recent studies state that this may be an overestimate and that displacement could be limited to within 100m of turbines (Haworth and Fielding, 2009).

Hen harrier was recorded regularly during baseline surveys with moderate flight activity and a total of 36 flights recorded during VP watches which are shown within **Annex 5.7**. Hen harrier flights were also recorded during Hen Harrier Roost Searches, flights recorded are shown in **Annex 5.8**.

Hen harrier flights recorded during VP watches included those within 250m of turbine locations, largely around T2, T5 and T6. The remainder of flights recorded were beyond 250m from turbines, while flight activity around other turbines was minimal. Assuming in a worst-case that birds would be displaced within 250m of T2, T5 and T6, there would be a loss of 58.89ha of foraging habitat. This would impact birds present during the non-breeding season.

During VP watches, hen harrier was recorded foraging across the survey area, while the vast majority of flights recorded during roost watches were around the roost sites with very little activity recorded within 150m of turbine locations. Although there would be displacement from foraging habitat within a small area within the project site, there is suitable foraging habitat immediately adjacent to roost sites, with additional suitable foraging habitat beyond the project site. Data collected and previous studies also indicate that during the non-breeding season hen harrier can be more transient, and as recorded during surveys will vary their roost locations and flight activity accordingly (O'Donoghue, 2020).

Considering the relatively small area within which birds would be displaced and low activity recorded within these areas, and the presence of suitable habitat surrounding roosts and beyond the project site, it is considered that impacts of displacement on roosting birds would be minor and not significant.

Barrier effects on roost sites would be negligible. Implementation of embedded mitigation will ensure that there are no operation phase disturbance/displacement effects on roosting hen harrier.

Kestrel

Collision Risk

CRM predicted 0.11 collisions per decade for kestrel. When extrapolated across the 40-year operational life of the project, this equates to 0.44 predicted collisions. This represents a very low level of collision risk and is not considered likely to result in a significant effect on the local kestrel population. Consequently, no significant effect arising from collision mortality is predicted at any geographic scale.

Displacement

Operational infrastructure may result in minor changes to habitat availability and prey abundance within the project site when compared to baseline conditions. However, kestrel is a generalist predator that utilises a broad range of habitats and was observed hunting throughout the wider landscape. Suitable alternative foraging habitat remains available beyond the project site and there is no evidence that the local population is reliant upon habitats within the project site. Consequently, no significant effect arising from habitat change or displacement is predicted at any geographic scale.

Lesser black-backed gull

Displacement

Lesser black-backed gull was recorded predominantly during the breeding season, typically in small numbers of one to two birds. Behaviour was primarily limited to flight activity and opportunistic foraging.

As reviewed by Furness (2013), Cook *et al.* (2014) and Humphrey *et al.* (2015), behavioural responses of lesser black-backed gull to operational wind farms are variable, with attraction, avoidance and no measurable response all reported. Post-construction monitoring at an onshore wind farm by Percival *et al.* (2018b) found evidence of localised micro-avoidance within approximately 100m of turbines, but no significant reduction in activity beyond this distance.

Given the limited use of the project site by small numbers of birds, the highly mobile nature of the species and the availability of extensive alternative foraging habitat within the wider landscape, any displacement or barrier effects associated with the operational turbines are expected to be minor. Consequently, no significant effect is predicted during the operational phase at any geographic scale.

Merlin

Merlin use of the project site is sporadic and appears to be largely opportunistic in nature, primarily associated with hunting activity and transit movements. The presence of operational turbines may result in some localised avoidance of turbine locations within the project site. However, extensive suitable foraging habitat remains available within the wider landscape and there is no evidence that merlin are reliant upon habitats within the project site. Consequently, any displacement or barrier effects are expected to be minor and no significant effects are predicted during the operational phase at any geographic scale.

Red grouse

Red grouse utilise the project site throughout the year and there is potential for breeding activity within suitable habitats. The presence of operational turbines may result in some localised avoidance of areas immediately surrounding turbine infrastructure. However, red grouse are generally considered to be at low risk from operational wind farms due to their predominantly low flight height, sedentary behaviour and strong association with ground-level moorland habitats. Collision risk is therefore considered negligible. Where displacement effects have been recorded, these are typically localised and temporary, with populations often returning to pre-construction densities following an initial period of adjustment (Pearce-Higgins *et al.*, 2012). Given the limited extent of potential displacement and the availability of suitable habitat within the wider project site, no significant operational effects are predicted at any geographic scale.

Snipe

Snipe predominantly utilise the bog habitats of the project site; there is evidence of three breeding territories within the 500m buffer, with a peak of two in a single breeding season. Although these have not been observed active in the most recent breeding seasons 2022 and 2023, there is still potential for breeding snipe to be displaced for the long term (40 years) during the operational phase. Pearce-Higgins *et al* (2009) found that snipe utilise habitat within 400m of turbines less than expected and suggested that breeding snipe densities may be reduced by up to 48% within 500m of operational turbines. However, there are studies suggesting that breeding birds may habituate over time and breeding densities within the 500m proposed turbine buffer return to or exceed baseline densities, e.g. Percival *et al.* (2016a & 2018c). For one of these wind farm projects, although not explicitly stated, snipe may have benefited from on-site management which included drain blocking.

The operation of the project, including the permanent loss of habitat and hydrological changes associated with infrastructure and peat storage areas, is likely to reduce the suitability of breeding habitat for snipe.

Applying a precautionary approach, and in the absence of mitigation measures, the operational phase of the project has the potential to result in the long-term displacement of one breeding pair (assuming displacement of a single pair from the peak of two) from previously occupied breeding habitat.

There is the potential that breeding birds could be accommodated within suitable habitat immediately adjacent to the project site. A loss of a single pair within Co. Roscommon (assuming a county population of 192 breeding pairs as per Lauder and

Balmer [2008]) would equate to 0.5% of the population and is not considered to be significant.

Swift

Swift are only present during the breeding season, typically between April and August, during which time they utilise the project site for feeding while on the wing. Given the extensive foraging range of the species, the project site represents only a small component of the wider landscape used for feeding.

Swifts readily habituate to manmade structures, and it is unlikely that foraging birds will be displaced by operational turbines. Conversely swift may be actively drawn towards turbines to glean insects that are active around turbine towers and hardstands (Rydell *et al.*, 2012). Considering this and the abundance of feeding habitat in the wider area, there is no likely significant effect during the operational phase at any geographic scale.

Woodcock

Woodcock was recorded only once during the non-breeding season. However, this is a highly cryptic species that is frequently under-recorded during conventional daylight surveys and is therefore assessed in the context of a locally important wintering population.

There is limited published information regarding woodcock responses to operational wind turbines. An unpublished Irish study (Gittings, 2019) suggested a potential displacement distance of up to 250m from turbines based on breeding season roding behaviour. The relevance of these findings to wintering birds is uncertain.

Given the very limited evidence of site use, the availability of extensive suitable wintering habitat within the wider landscape and the lack of evidence that woodcock are reliant upon habitats within the project site, any displacement effects are expected to be limited. Consequently, no significant operational effects are predicted at any geographic scale.

5.5.5.6 Freshwater Ecology

Once operational, the passage of vehicles over bridges and along tracks is unlikely to be a major cause of disturbance. Additionally, downstream watercourses which are potentially viable with salmon/lamprey/crayfish potential are outside of the proposed operational site boundary and therefore direct effects are not anticipated.

Significance of impact: the potential direct impacts are considered to be low risk and therefore not significant.

The processes leading to changes in flow described under construction phase would continue in the absence of mitigation, although at a substantially reduced level. Inputs of sediment and pollutants will be reduced, but still with some potential for contamination. Permanent infrastructure, including tracks, hardstandings and spoil deposition areas, would continue to influence runoff pathways and surface water management. Most of the impacts identified under the construction phase therefore, while considerably reduced, would still operate in the absence of mitigation.

Significance of effect: Flow changes and contamination by sediment, nutrients and pollutants could be propagated downstream via the Owengarve River, where they

have the potential to affect freshwater pearl mussel, white-clawed crayfish, salmon and lamprey habitat, and therefore the populations of these species within the River Moy SAC. As these populations are of international importance, such effects would be considered significant at an international level in the absence of mitigation.

For downstream aquatic fauna in the Lung River, including white-clawed crayfish, secondary effects during the operation phase are considered to have the potential to be significant at the Local (higher) scale.

5.5.5.7 Amphibians and Reptiles

During the operation phase of the project, no further significant direct or indirect impacts on local populations of common lizard (*Zootoca vivipara*) and smooth newt (*Lissotriton vulgaris*) are anticipated.

Suitable peatland habitat will remain in the immediate vicinity of the project post-construction, supporting the continued presence and viability of local amphibian and reptile populations. No additional habitat disturbance, pollution, or barriers to movement are expected during operation, thereby minimising risk to these species.

Consequently, the impacts of the operation phase on common lizard and smooth newt are assessed as not significant.

5.5.5.8 Invertebrates

Operational activities are not expected to cause further disturbance or mortality to marsh fritillary (*Euphydryas aurinia*) butterflies or their larval webs. Therefore, the effects of the operation phase on the marsh fritillary are considered not significant.

5.5.6 DECOMMISSIONING PHASE

Decommissioning of the project is described in **Chapter 3**. It is anticipated that the decommissioning process will involve similar activities to the construction process, but these will be undertaken in reverse. All above ground structures (i.e. turbines, hardstandings, access tracks) will be removed and the project site will be returned to its previous state as much as is practicably possible. As the removal of the underground drainage structures and electrical cables may have more of an environmental impact if they were to be removed, these features will remain in-situ, where appropriate.

Decommissioning phase impacts that are expected to result in potentially significant effects on terrestrial ecology and Important Ecological Features, as listed in **Section 5.5.6**, include the following:-

- Disturbance and displacement of fauna;
- Loss of nesting/roosting sites;
- Temporary lighting impacts; and,
- Water quality impacts arising from surface water run-off of sediments and/or an accidental pollution spill.

5.6 MITIGATION MEASURES

5.6.1 MITIGATION BY AVOIDANCE

5.6.1.1 Designated Sites

Proposed mitigation measures required to prevent adverse effects on Natura 2000 sites within the Zone of Influence are outlined in the Natura Impact Statement (NIS) for the project (APEM Group Woodrow 20265). The project is not located within the boundaries of the Natura 2000 network, and as such the project demonstrates direct avoidance of sites of international importance, including Lough Gara Ramsar site. Similarly, the project avoids sites of National importance such as NHAs and pNHAs.

5.6.1.2 Habitats

RAs described in **Section 5.4** in the absence of mitigation the project will have likely significant effects on several habitats of *Local (higher) importance*, *County importance* and *National importance* across the project site, including:-

- (FW4) Drainage ditch;
- (PB2) Upland blanket bog;
- (PB4) Cutover bog;
- (WN7) Bog woodland;
- (WL1) Hedgerow;
- (WL2) Treelines; and,
- (WS1) Scrub.

Avoidance of (FW4) Drainage ditch

The direct loss of (FW4) Drainage ditches to construction will be strictly limited to sections essential for the viability of the project, with all feasible measures taken to retain existing ditches where possible and to avoid unnecessary crossings or culverting. (FW4) Drainage ditches are considered significant at *Local (higher) importance* due to the connectivity they provide across the landscape and their role as habitat for species of *Local (higher) importance*, including common frog, smooth newt, and otter.

Avoidance of (PB2) Upland blanket bog

The project site contains *viable areas* of Annex I habitat type 7130* Blanket bog (active), which pass the monitoring stop criteria. These areas were identified as a high constraint to development as a habitat of *National importance* early in the design phase of the project. The preliminary site layout was re-designed to avoid direct loss of these ecological features as much as possible.

Avoidance of (PB4) Cutover bog

The ecological value of the (PB4) Cutover bog habitat varies depending on the quality of the habitat, namely:-

- County importance for active (PB4) Cutover bog, which aligns with the Annex I habitat type 7130* Blanket bog (active); and,

- Local (higher) importance for inactive (PB4) Cutover bog.

Where possible, the direct loss of (PB4) Cutover bog was avoided and the footprint of the development preferentially located within habitats of lower ecological importance, such as (WD4) Conifer plantation and (GS3) Dry-humid acid grassland, and (GS4) Wet grassland.

Avoidance of (WN7) Bog woodland

The direct loss of (WN7) Bog woodland (non-Annex I) will be strictly limited to sections essential for the viability of the project.

Avoidance of (WL1) Hedgerows and (WL2) Treelines

The direct loss of (WL1) Hedgerows and (WL2) Treelines will be strictly limited to sections essential for the viability of the project, with all feasible measures taken to retain ecological connectivity within the landscape.

Avoidance of (WS1) Scrub

The direct loss of (WS1) Scrub will be strictly limited to sections essential for the viability of the project.

5.6.1.3 Invasive Alien Species

Medium and high impact invasive species such as cherry laurel, Rhododendron and Japanese knotweed were recorded within the project site. Due to the passage of time from initial site surveys to the start of construction works, a preconstruction invasive species survey must be carried out to determine baseline conditions for the presence of invasive species. Results of this survey will be presented in a site-specific Invasive Species Management Plan (ISMP) which will be prepared by the Appointed Contractor. The management plan will set out strict biosecurity measures with reference to Best Practice guidance to ensure there is no potential for the spread of alien invasive species during the construction works.

Measures within the ISMP will include (but are not limited to) 1) A Method Statement for avoidance of invasive species within the project site; 2) if avoidance is not possible then removal and treatment measures will be required to be used to prevent the spread of invasive species; and 3) A specialist invasive species contractor will be employed during the project life to ensure all removal and treatment is carried under the appropriate licensing and guidance.

While the ISMP will contain specific measures (relevant to specific species) to be employed on site subject to the outcome of the pre-construction invasive species, the following measures will be employed as a matter of course:-

- An invasive species management plan will be developed and implemented. This will include the general prevention and containment measures and species-specific treatment measures as may be required;
- An Ecological Clerk of Works will be employed for the duration of the construction period to make contractors aware of any invasive and non-native species sensitivities of the project and to undertake pre-construction surveys, enforcing any exclusion zones and mitigation measures as required;

- Use of toolbox talks as part of site introduction to workers, including what to look out for and what procedures to follow if invasive species are observed;
- Signs will be used to warn workers of invasive species contamination;
- Only planting and sowing of native species if any reinstatement works are required or where invasive plant species are physically removed;
- Unwanted material contaminated with invasive species will be transported offsite by an appropriate licenced waste contractor and disposed of at a suitably licenced facility (NRA, 2010);
- Good hygiene practices will be adhered to including the removal of build-up of soil on equipment; keeping equipment clean; washing vehicles exiting the site using a pressure washer to prevent the transport of seeds; storing wastewater from washing facilities securely and treating to prevent spread of invasive species; checking footwear and clothing of workers for seeds, fruits or other viable material before leaving the site; any plant material arising from cleaning equipment, footwear and clothing will be carefully disposed of following (NRA, 2010) guidelines in such a manner not to cause the spread of invasive species;
- A pre-construction walkover survey of the project will be undertaken during the growing season (April to August). This will search for invasive and non-native species, which could change over time. The extent of invasive plant species will be physically marked out if there have been any changes since baseline surveys; and,
- If any are identified, then appropriate exclusion zone(s) will be implemented. A buffer will be used to cordon off invasive species outside the works footprint.

5.6.1.4 Terrestrial Mammals

Direct impacts on terrestrial (non-volant) mammal IEFs (otter, badger, pine marten and red squirrel) from construction works are generally limited to the death/ injury of individuals becoming trapped within open excavations.

During the design phase of the project, a badger sett was identified (see **Annex 5.4 – Confidential Badger Report**). To avoid directly impacting on the sett, a set-back distance of 50m was imposed. Likewise, an outlier sett (**Annex 5.4**) was avoided by re-aligning the access track to ensure a standoff >30 m was retained.

Due to the presence of suitable habitat for otter and badger within the project site and within the Zol of the project site, and the mobile nature of these species, a pre-works ecological constraints walkover survey will be carried out by an appropriately qualified Ecologist. If breeding otter holts are discovered, then construction must stop within 150m until the holt is no longer in use. NPWS can be consulted to obtain a derogation, but this process and criteria is frequently changing and may be difficult to obtain.

The baseline surveys found badger setts adjacent to the works corridor. The following mitigation measures will be applied to avoid disturbance to badgers:-

- Where possible, no works will be undertaken within 50m of active badger sett(s), as measured from all the entrances to burrows;

- Where this is not possible, a method statement will be drafted based on pre-construction badger surveys carried out on site by a suitably qualified Ecologist a minimum of –4-6 months prior to site works. Seasonal restrictions and badger sett closures (temporary or permanent) may be required. And all such work would require approval from the Local Authority and local NPWS ranger;
- Ideally, all heavy machinery will be excluded from areas within 30m of active badger sett(s), as measured from all the entrances to burrows;
- TII guidance and mitigation: 'Guidelines for the Treatment of Badgers Prior to the construction of National Road Schemes' will be followed and form the best practice guidance;
- Exclusion zone buffers of 30m around all sett entrances will be marked off prior to commencement of construction works to ensure protection of these locations. Buffer zones will be appropriately signposted and will be marked out using fencing posts and rope; and,
- To avoid the period of time when badgers are particularly sensitive to disturbance (birthing and raising young cubs); no heavy construction works, including tree felling will be undertaken during the badger breeding season (December to June inclusive) if occurring near an active badger sett. This will be assessed by the appointed ECoW 4-6 months prior to works commencing.

Disturbance to foraging mammals will be avoided by:-

- Construction works being largely limited to daylight hours allowing nocturnal animals like badgers and otters to forage through the night; and,
- Minimising the risk of mammals becoming trapped if falling into excavated holes and trenches through the provision of egress points, e.g. placing escape planks or spoil runs. In addition, the length of time holes will be exposed will be limited.

Indirect impacts on otters from construction works were identified to generally include impacts on prey species from potential water quality deterioration impacts. Subsequently this is fully considered within **Chapter 7 (Water)** and within the measures outlined to protect water quality which includes mitigation both in terms of designed avoidance measures as well as specific construction phase mitigation, including water quality monitoring, pollution prevention and construction best practice. This mitigation is not repeated in this chapter but must be applied in full to protect water quality and prevent impacts on other prey species, including from any potential cumulative impacts.

Following full implementation of these proposed mitigation measures, the potential for significant residual effects upon terrestrial (non-volant) mammal IEFs is assessed to be not significant.

5.6.1.5 Bats

While no active roosts were identified in the vegetation to be removed, it is acknowledged that roosting bats could occupy PRFs transitionally, especially with tree roosting species that can occupy up to 20 different trees interchangeably. Therefore, further mitigation on a precautionary basis will be applied in the form of

pre-construction tree inspections to identify and protect any bats potentially occupying roosts in vegetation designated for removal. Vegetation removal will also be carried out, where possible, during the period when bats are least likely to be using tree roosts (November to March) to further diminish the likelihood of any roosting bats being present. Refer to **Table 31** for appropriate working months.

For any occupied or likely occupied roost sites where vegetation removal is not proposed (around F.1), an exclusion zone will be implemented to prevent disturbance during times of occupancy. provides optimal time periods for works depending on the roost type, and therefore by extension restrictive periods for construction works, during which the exclusion zone for construction work would be applicable. Reporting of pre-construction bat surveys and action taken will be required to demonstrate due diligence regarding avoidance of disturbance to roosting bats.

The principal mitigation measure incorporated into the design of the proposed development to reduce the potential risk of bat collision and barotrauma is the application of bat feature buffers between turbines and habitats used by bats for foraging and commuting.

In accordance with the guidance *Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation* (NatureScot *et al.*, 2021), a precautionary separation distance has been applied between turbine rotor-swept areas and identified bat habitat features. The required separation distance is calculated based on turbine dimensions and the height of adjacent vegetation or habitat features.

NatureScot guidance recommends that a minimum buffer of 50 m is maintained between the rotor-swept area and features likely to be used by bats, including woodland edges, treelines, hedgerows and other linear landscape features. The buffer distance is measured from the outermost tip of the turbine blade to the nearest bat habitat feature.

Bat feature buffers for the proposed development were calculated using the NatureScot methodology and have informed the turbine layout and vegetation management requirements. Where required, vegetation removal has been incorporated into the design to achieve compliance with the recommended stand-off distances and thereby reduce collision risk for bats during the operational phase.

The calculated bat feature buffers for each turbine are presented in **Table 32**, and the methodology used to derive the buffers is illustrated in the NatureScot guidance document. Implementation of these buffers forms a key element of the project's bat mitigation strategy and contributes to reducing operational collision and barotrauma risk to levels that are not significant.

Feature ID	PRF Suitability
Maternity	01 Oct to 01 May
Summer (not a proven maternity site)	01 Sep to 01 May
Hibernation	01 May to 01 Oct
Mating/swarming	01 Nov to 01 Aug

Table 31: Optimal season for works at different roost types

Turbine model	Turbine buffer distance (m)
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	Feature height (m)	NatureScot (50m)
Turbine T1-T3 – Vestas V162	0	80
	3	83
	5	86
	10	91
	15	96
Turbine T4-T10 – Vestas V136	0	85
	3	88
	5	89
	10	93
	15	97

Table 32: Bat buffer calculations using two turbine models in relation to feature height and the buffers recommended by NatureScot

Removal of hedgerow vegetation and replacement planting will mitigate the impacts of artificial lighting at night on the project site as the replanting has been designed to encourage foraging and commuting bats away from turbine locations, thereby reducing the attraction effect of lighting for certain collision-risk bat species. The use of screening planting around the substation and motion-sensor controlled lighting will minimise the impact of the lighting installations.

5.6.1.6 Freshwater Ecology

Proposed mitigation measures, required to prevent adverse effects on watercourses and downstream Natura 2000 sites during construction, are outlined in the Natura Impact Statement (NIS) for the project. The mitigation measures included in the NIS relate to protection of water quality flowing into the Owengarve River and thus downstream into the River Moy SAC and the Lung River which flows into the Lough Gara SPA. The mitigation measures proposed are taken from **Chapter 7** (Water) and the associated **Annex 3.4** (CEMP and SWMP) and are designed to avoid adverse effects on local watercourses and groundwater. With the implementation of these measures in full, they will ensure avoidance of significant effect on the watercourses within the study area, the European sites, and the Qualifying Interests (QIs), including lamprey species, Atlantic salmon, white-clawed and otter that they support. Mitigation measures provided in the CEMP and NIS include:-

- Avoidance of sensitive aquatic areas where possible by implementing a 50m construction zone buffer;
- As described in **Chapter 7** (Water), specific mitigation measures, incorporated into the design of the development and through implementation of best practice methodologies will be employed where work inside buffer zones is proposed for the watercourse crossings required;

- Any works for stream crossings will be carried out during the working window for instream works. This working window is defined by Inland Fisheries Ireland (IFI) as 01 July to 30 September to avoid vulnerable spawning salmonids/lamprey that may be present in downstream environments outside of this window. Any works outside of this period would require a derogation under the Local Authorities (Works) Act, 1949 and permissions from Inland Fisheries Ireland after consultation;
- Work in areas liable to sediment erosion to be carried out only during dry conditions and no excavations to take place during forecasted yellow or higher rain warnings. Topsoil stripping and peat removal to be carried out only during dry conditions. All other work to be undertaken in dry conditions wherever possible, and no works (other than monitoring) to be carried out during heavy rain or snowmelt;
- There will be no crossing of rivers or streams by machinery during the construction phase, other than by constructed access routes, and all machinery must remain within the works corridor and utilise designated access routes. Constriction machinery to access the project site via alternative means to the river crossing wherever possible;
- There will be no direct dewatering to watercourses during the construction phase. All outflows from drainage associated with construction will be by diffuse overland drainage at appropriate locations and through settlement ponds/tanks/silt socks;
- For works taking place within watercourse buffer zones, enhanced sediment control measures including double silt fencing and additional filtration controls will be implemented where required in accordance with the CEMP and SWMP;
- Cement leachate, hydrocarbon oils and other toxic poisonous materials will require full containment and will not be permitted to discharge to any waters, and control measures to be place will include:-
 - Appropriate bunded storage area for storage of fuels/oils, with onsite storage of hydrocarbons to be kept to a minimum;
 - Mobile double skinned fuel bowser will be used for re-fuelling on-site;
 - No refuelling will be permitted at works locations within the 50m hydrological buffer;
 - Spill kits will be readily available to deal with any accidental spillage;
 - There is an outline emergency plan for the construction phase to deal with accidental spillages;
 - Ready-mixed concrete will be brought to site, with no batching of wet-cement products occurring on site;
 - Where possible pre-cast products will be installed, including all watercourse crossings;
 - Use of wet-cement products within the hydrological buffer will be avoided, insofar as possible;

- Lined cement washout ponds will be used for chute cleaning, with minimal use of water take will be imported to the project site;
- No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be permitted; and,
- Wastewater emanating on-site (sewage, wastewater from site office) will be taken off-site for disposal/treatment at controlled facilities. To this effect, welfare facilities for construction site workers will include self-contained porta-loos with an integrated waste holding tank. No water will be sourced on the project site, nor will any wastewater be discharged to the project site. Foul drainage from the temporary site offices and facilities is to be properly stored and removed to a suitable treatment facility. Storage facilities should be robust enough to ensure no spillage or leakage occurs.

Chapter 7 (Water) also provides details of the Sustainable Drainage Systems (SuDS) that will be implemented to manage surface water taking account of water quantity (flooding), water quality (pollution) and associated ecological receptors. The drainage design will incorporate the following key elements:

- Clean water interceptor drains to collect and divert upslope runoff away from construction areas and prevent unnecessary contamination;
- Swales and drainage channels to collect and convey runoff from construction and operational infrastructure;
- A treatment train approach comprising interception, attenuation, settlement and controlled discharge measures in accordance with the SWMP (**Annex 3.4**)
- Check dams and other flow attenuation measures to reduce runoff velocities, promote settlement and minimise erosion.
- Settlements ponds and buffered outfalls to provide attenuation and treatment of runoff prior to diffuse discharge at greenfield runoff rates. No direct discharge of untreated runoff to mapped watercourses will be permitted.

The project site drainage and attenuation system will be installed prior to the main construction activities and includes excavation of drainage ditches and installation of settlement ponds and soakaways. The site-specific drainage scheme is required to attenuate, hydraulically (flow) and hydro-chemically (pollutants), the projected increase in runoff of ca. 63 m³/day (worst-case scenario) that will arise from the creation of additional areas of hardstanding. **Chapter 7** (Water) also provides details of management of soil/peat deposition areas to avoid impacting on water quality including:-

- Spoil deposition areas are located outside the 50m stream buffer zone;
- Silt fences, straw bales and biodegradable matting will be used to control surface water runoff for deposition areas; and,
- Deposition areas will be sealed with a digger bucket and vegetated as soon possible to reduce sediment entrainment in runoff.

Other measures include:-

- To avoid run-off of silt-laden water impacting upon water quality within surface water features adjacent to the works corridor, reinstatement works including measures to re-vegetate disturbed areas through re-seeding and/or placement of saved turves will be carried out immediately after construction works;
- During construction, turves will be stored separately from spoil (soil/rock). Separate storage of turves will ensure vegetation is not significantly damaged and that turves can be replaced as a top mat to facilitate rapid reinstatement of the surface vegetation, thereby significantly reducing the likelihood of soil erosion and the likelihood of silt laden surface waters affecting water quality;
- To ensure control measures are implemented appropriately, an Environmental Manager as part of the construction team will be employed for the duration of the construction works; also an independent Ecological Clerk of Works (ECoW) will be auditing the project site intermittently to report on the efficacy of mitigation measures put in place by the appointed contractor; and,
- Water quality monitoring will be undertaken before, during and following construction works in accordance with the Water Quality Monitoring Plan and SWMP (**Annex 3.4**). Monitoring will include regular visual inspections, field hydrochemistry measurements and water quality sampling at agreed monitoring locations.

The implementation of these measures will ensure that a deterioration of water quality in downstream watercourses will not occur such that the downstream watercourses and designated sites with the aquatic QI species and habitats that they support do not experience any likely significant adverse effects. Further information on proposed mitigation measures for species-specific aquatic IEFs has been provided within **Section 5.6.1.6**.

Following full implementation of these proposed mitigation measures, the likelihood of significant residual effects upon freshwater ecology will be considered not significant.

5.6.1.7 Amphibians and reptiles

No mitigation measures are necessary for common lizard and smooth newt as the impacts of the project are not considered likely to be significant.

5.6.1.8 Invertebrates

The permanent loss of approximately 0.6ha of marsh fritillary (*Euphydryas aurinia*) habitat and the mortality of four larval webs because of the project will be addressed through a combination of mitigation measures, including avoidance. Further details are also provided in **Annex 5.3**.

All construction activities at T10 will be scheduled when marsh fritillary butterfly are on the wing (May-July) (NIEA, 2017) insofar as practicable. Adult butterflies only fly in warm, sunny conditions, so construction activities at T10 will only take place in favourable weather conditions between 10.30 and 16.30 (NIEA, 2017), where possible, following a site check by the appointed Ecological Clerk of Works. Construction works must be designed to avoid the peak larval development period (August-April) in order

to minimise incidence of mortality (NIEA, 2017). An ECoW will be present to survey for any larval webs within suitable habitat within the project footprint, and will have authority to stop works should marsh fritillary larva be present.

5.6.2 MITIGATION BY REDUCTION

5.6.2.1 Designated Sites

Mitigation measures will be implemented by the contractor to ensure the protection of downstream waters and habitats in Natural 2000 and nationally designated sites (NHAs and pNHAs). These measures are outlined in detail in **Section 5.6.1.1**.

5.6.2.2 Habitats

Where the direct loss of habitats could not be avoided, every effort has been made to reduce the direct and indirect impacts on these habitats of *Local (higher) importance* and above.

(FW4) Drainage ditch

The project infrastructure intersects with (FW4) Drainage ditches at multiple locations. As such, a standard 50m buffer zone with all (FW4) Drainage ditches cannot be implemented across the project site. Where works/infrastructure interfaces with drainage ditches, appropriate design measures will be implemented to minimise the effect on the habitat and to avoid any hydraulic change to the channel.

(WL1) Hedgerow, (WL2) Treelines and (WN7) Bog woodland

To avoid construction damage from excavation or compaction to the roots of plants in hedgerows, treelines and woodlands adjacent to the proposed infrastructure that will be retained post-construction, appropriate root protection area (RPAs) will be implemented, in accordance with best practice guidance (NRA 2006). To this effect an appropriately qualified arboriculturist will undertake a pre-construction assessment to ensure impacts to vegetation are avoided.

(PB2) Upland blanket bog

In the absence of mitigation, the project will have an overall negative effect on the (PB2) Upland blanket bog habitat across the project site, the significance of which will vary depending on the quality of the habitat lost, namely:-

- National importance for the indirect loss of 2.41ha of active (PB2) Upland blanket bog which aligns with the Annex I habitat type 7130* Blanket bog (active). This includes 0.13ha of (PB2) Upland blanket bog not assessed against Annex I criteria and 0.44ha outside of the project boundary (included as a precautionary approach).

(PB4) Cutover bog

In order to minimise impacts, the site layout aimed to avoid intact areas of active peatland. Cutover bog of *County importance* and *Local (higher) importance* did fall within the footprint of the works, including (PB4) Cutover bog which aligns with Annex I habitat type 7130* Blanket bog (active), Annex I 7130 Blanket bog (inactive) and

Annex I 4010 Northern Atlantic wet heaths with *Erica tetralix*. The monitoring stops in these areas largely failed the Annex I assessment.

To avoid widespread disturbance to (PB4) Cutover bog and other habitats, access within the project site will be restricted to the proposed works corridor. No access between different parts of the infrastructure will be permitted, except via the proposed works corridor. An experienced and suitably qualified ECoW will be employed for the pre-construction, during and completion of construction works. They will be tasked with monitoring work practices, which will ensure that construction activities are tightly constrained to the works corridor and the project footprint, and that all mitigation is appropriately applied on site. They will have the power to stop works and can proposed suitable amelioratory action as required during the works.

(WN7) Bog woodland

In order to minimise the impacts, the direct loss of (WN7) Bog Woodland (non-Annex I) has been limited to a c. 21m² of narrow linear strip along the edge of the existing unnamed road. This section of the (WN7) Bog woodland is already subject to edge effects due to the proximity of the unnamed road. As such, the proposed works will not result in significant additional fragmentation of the parcel of (WN7) Bog woodland. The area of impact upon this habitat will be reviewed by the Appointed Arborist and the Appointed Ecologist to ensure minimal habitat removal on site during the works.

(WS1) Scrub

To minimise ecological impacts associated with the direct loss of (WS1) Scrub, clearance works within woody vegetation will be scheduled outside the bird breeding season (March 1st to August 31st, inclusive) insofar as possible, and an ECoW will survey such habitat before it's removal. The ECoW will check for the resting places of protected species in accordance with best practice and legal requirements under the Wildlife Act 1976 (as amended). They will also confirm where scrub removal is absolutely necessary and aim to avoid removing habitat where it is not likely to be impacted by the project footprint.

5.6.2.3 Dust Impacts on Habitats

The contractor will be required to implement the following standard practice construction methods and mitigation measures for release of dust:-

- Preparing and maintaining the project site;
- Plan construction compound layout so that machinery and dust causing activities are located away from receptors, as far as is possible;
- Erect a 2m minimum site hoarding around all construction/ contractor compounds;
- Keep site fencing, barriers and scaffolding clean using wet methods; and,
- Cover, seed or fence stockpiles to prevent wind whipping.

5.6.2.4 Roosting Bats

Trees requiring felling and identified as having roost suitability, where surveying proves that features are unoccupied, will be soft felled, as outline in with the National Roads Authority guidelines (NRA, 2005). This procedure involves:-

- Where tree removal is extensive (T2 and T3), instigate staggering or phasing felling over several days or weeks to reduce sudden loss of habitat and allow for gradual dispersal;
- Removing the tree in sections, starting with the top branches and then working down the trunk trying to avoid cutting through cavities;
- Any sections with PRFs must be lowered with care and laid on the ground with potential entrances to roosts orientated upwards to allow bat to vacate the roost; and,
- Sections must be left *in situ* for at least 24 hours in suitable weather conditions to allow any bats to disperse. In addition to leaving sections in situ for 24 hours, reattaching or storing felled PRF-containing sections in adjacent retained woodland would act as artificial roost opportunities.

5.6.2.5 Freshwater Ecology

The measures have been based on the following best practice guidelines to ensure that water bodies are adequately protected during construction work:-

- Construction Industry Research and Information Association (CIRIA), 2001. *Control of water pollution from construction sites: Guidance for consultants and contractors* (C532). London: CIRIA;
- Construction Industry Research and Information Association (CIRIA), 2005. *Environmental good practice on site* (C650). London: CIRIA;
- Construction Industry Research and Information Association (CIRIA), 2006. *Control of water pollution from linear construction projects: Technical guidance* (C648). By Murnane, J., Heap, A. and Swain, A. London: CIRIA;
- Construction Industry Research and Information Association (CIRIA), 2006. *Control of water pollution from linear construction projects: Site guide* (C648). By Murnane, J., Heap, A. and Swain, A. London: CIRIA;
- Construction Industry Research and Information Association (CIRIA), 2007. *The SUDS Manual* (C697). London: CIRIA;
- Environment Agency, 2004. *Pollution Prevention Guidelines (PPG)*. UK: Environment Agency;
- Inland Fisheries Ireland (IFI), 2016. *Guidelines on protection of fisheries during construction works in and adjacent to waters*. Dublin: IFI; and,
- Loughs Agency, n.d. *Fisheries protection during development works (Foyle and Carlingford areas): Environmental Guidelines Series – No. 1*. Derry: Loughs Agency.

The contractor will be required to implement standard practice construction methods and mitigation measures for in-stream or near-stream works. The following measures are to be read and implemented in conjunction with the Construction Environmental

Management Plan (CEMP) and Surface Water Management Plan (SWMP) (**Annex 3.4**):-

- Maintain a minimum 50m buffer from watercourses wherever practicable and a 50m stand-off from wells and boreholes, in order to minimise the risk of impacts arising from tracks, turbine foundations, hardstandings, spoil storage areas and other construction activities. Where works are required within these buffer areas, including at identified watercourse crossings (i.e. near T4 and T9), site-specific mitigation measures will be implemented in accordance with the Water Chapter (**Chapter 7**) and CEMP (refer to **Annex 3.4**);
- Spoil will be stored in line with a spoil management plan, which is included at **Annex 6.2** of the EIAR;
- Peat and spoil storage areas will be located outside watercourse buffer zones and managed using silt fencing, straw bales, biodegradable matting and settlement infrastructure. Storage areas will be stabilised and revegetated as soon as practicable following placement to minimise sediment mobilisation and erosion.
- For works occurring within 50m of a watercourse, weather conditions will be continuously monitored (e.g. via Met Éireann) and earthworks scaled back or suspended where forecast rainfall exceeds the trigger thresholds set out in the SWMP, including high-intensity rainfall events (>10mm/hr) and prolonged heavy rainfall (>25mm in 24 hours);
- In the event of heavy rainfall, open excavations or peat storage works will be secured, and emergency drainage measures will be implemented to prevent water backup and pollution;
- It will be ensured that the site drainage system does not discharge directly into watercourses, but rather through a riparian buffer area of intact vegetation.
- All outflows from drainage associated with construction activities will be treated through temporary settlement ponds and associated drainage controls prior to discharge. Treated water will be discharged via buffered outfalls and diffuse overland flow across vegetated areas, in accordance with the SWMP (see **Annex 3.4**), thereby preventing direct discharge of untreated runoff to mapped watercourses;
- Watercourse crossings will be constructed during low-flow periods, adhering to any working period restrictions imposed, with filtration measures installed downstream to trap sediments;
- Silt traps and fencing will be placed in working areas that have the potential to carry silt-laden material from the working area to aquatic environments;
- Refuelling of machinery will take place in bunded enclosures, at a minimum of 50m away from watercourses to prevent runoff into nearby watercourses. All machinery must carry an onboard spill kit in the event of an oil/fuel spill during all phases;
- A complete mechanical check of all hoses and fluid reservoirs of machinery will be carried out by a competent member of the construction team before the machinery arrives at the project site;

- To reduce the amount of silt-laden water to be treated, temporary cut-off drains will be created to divert water away from dirty water and construction areas. This will lessen the volume of water to be treated onsite;
- Deposition areas for spoil will be enclosed with silt fencing to prevent mobilisation of solids during adverse weather conditions and no drainage from these areas will be directed into the temporary drainage systems (see CEMP in **Annex 3.4**). A Sustainable Urban Drainage System (SUDS) will be implemented to allow controls to be designed for the retention of large volumes of water that may arise from spoil deposition areas;
- Surface water runoff will be managed through a treatment train comprising interceptor drains, swales, check dams, silt traps and settlement ponds, with treated water discharged via buffered outfalls and diffuse overland flow in accordance with the project SWMP (**Annex 3.4**).
- Re-seeding of all areas of bare ground or the placement of jute matting will take place as soon as practicable to prevent run-off; and,
- All onsite welfare facilities will be installed and managed as per regulations to prevent nutrient overloading of aquatic environments.

5.6.2.6 Measures Specific to Earthworks

- Earthworks and exposed areas/soil stockpiles will be re-vegetated to stabilise surfaces as soon as practicable, using appropriate native plant (e.g. heather brash) seed from a local source;
- Hessian, mulches or tackifiers will be used where it is not possible to re-vegetate or cover with topsoil, as soon as practicable; and,
- Vegetation removal and exposure of soils will be minimised as far as possible, with only areas being actively worked on being exposed, to minimise silt mobilisation.

5.6.2.7 Amphibians and Reptiles

No mitigation measures are necessary for common lizard and smooth newt as the impacts of the project are not considered likely to be significant.

5.6.2.8 Invertebrates

Translocations of larval webs are not supported as a mitigation measure by Butterfly Conservation Ireland, due to the high rate of failure. However, in an effort to mitigate the risk of direct mortality, following a pre-construction survey in Mid-August/September/October (by a suitably experienced Ecologist) to update the location of webs, the turves supporting the larval webs at turbine T10 will be removed in November-February when the larvae hibernate and become less sensitive to light disturbance (DAERA, 2023). The turves will be translocated to an alternative area, which supports abundant devil's-bit scabious, located to the east of T1. This condition of the habitat in this area was assessed as suitable under-grazed. Further details on translocation can be found in the Habitat Management Plan (**Annex 5.3**).

5.6.3 MITIGATION BY REMEDY

5.6.3.1 Habitats

A Habitat Management Plan has been developed to detail the specifics for mitigation by remedy for habitats (**Annex 5.3**), particularly in respect of peatland habitats.

Additionally, approximately 460m of hedgerow habitat and 5m of treeline will be removed as a result of the project. It is proposed that the planting of c. 700m of new and enhanced hedgerow habitat to offset for the direct loss of these features will similarly provide sufficient mitigation for indirect impact upon terrestrial (non-volant) mammal IEFs foraging and commuting within the project site. Replacement planting will occur along lengths removed to facilitate the construction of temporary enlarged access where appropriate on the approaches to T6 and T10. Additional new planting along historic field boundary lengths to the east of the access towards T6 and adjacent peat storage.

5.6.3.2 Roosting Bats

As a short-term mitigation measure, the installation of bat boxes within the woodland and treelines outside of the bat buffer zones (and outside of the project footprint) will take place prior to construction works. To replace potential roosting features being lost, eight Schwegler 2F (or similar woodcrete alternatives) bat boxes will be installed on suitably mature trees. Boxes will be installed at a height of around 3m under the supervision of a Bat Ecologist.

In the long-term mitigation, there will be a like-for-like replacement of treelines lost as a result of the proposed infrastructure or required to be felled in order to achieve sufficient buffers to avoid potential impacts on bats. It is acknowledged that there will be a time lag for replanted treelines to compensate fully for the established treelines that will be removed, therefore compensatory planting will take place as early as possible.

5.6.3.3 Curtailment for Bats

Based on recorded activity levels and expected activity levels once areas of vegetation have been removed for bat buffers, curtailment will not be required at any of the turbine locations. Common and soprano pipistrelle are known to have a high affinity to features, such as treelines and hedgerows, which provide sheltered foraging conditions during higher wind conditions. When these features are removed, residual activity for these species will likely drop at these locations. Recorded Leisler's bat activity was moderate to low at two turbine locations (T2 and T3) and following the implementation of bat vegetation buffers, this is likely to drop further with the removal of vegetation. Therefore, mitigation by curtailment of turbine operations will not be required. However, due to the considerable habitat alterations proposed at the project site regarding vegetation removal, especially in terms of the creation of new edge habitats and disruption of connectivity at T2 and T3, it is acknowledged that the patterns of bat activity emerging post-construction can be altered from the baseline conditions. Therefore, any curtailment plan would need to be based on any needs arising from post-construction monitoring, needs to be dynamic and should be informed by smart monitoring while turbines are operational. In this regard the NatureScot guidelines, provide:-

“In order to evaluate the success of the curtailment regime, a minimum of 3 years of monitoring should take place during which time casualty searches and acoustic monitoring should take place concurrently. If necessary, over this period the curtailment regime can be refined to "smart curtailment" informed by the weather data and bat activity data”.

Monitoring will be carried out post-construction at each of the turbine locations and will involve monitoring at height to assess the level of post-construction activity for collision risk species. **Section 5.7.4** outlines the proposed post-construction monitoring strategy for adoption once wind farm becomes operational. Over the first three years of operation a combination of data collected from:-

- bat activity monitoring (seasonal deployment of static bat detectors) including continuous monitoring at height;
- carcass searches around turbines; and,
- deployment of a fully automated weather station with 4G connectivity.

The data will be used to monitor post-construction bat activity at turbine locations and to verify the effectiveness of the mitigation measures. Should monitoring identify activity levels or mortality rates that differ materially from those predicted in this assessment, the need for additional operational mitigation measures will be reviewed.

5.6.3.4 Compensatory Habitat for Commuting and Foraging Bats

To offset each unavoidable loss of potential bat commuting and foraging habitat and to adhere to a biodiversity enhancement approach, equivalent areas for compensatory habitat enhancement and replanting have been identified on site but outside the bat buffers (see **Annex 5.3**).

5.6.3.5 Birds

To offset the effective loss of hen harrier foraging habitat through displacement within 250m of turbine locations, bog restoration will be undertaken as detailed within the HMP. There will be 1.34ha of forest to bog restoration which is further than 250m from turbine locations. In addition, there will be rewetting of degraded bog habitat present across the project site. Bog restoration will improve habitat quality and support additional small birds and mammals, thus providing greater quality foraging habitat for hen harrier. This will offset some of the effective loss of foraging habitat for hen harrier through displacement.

Bog restoration will also benefit other avian IEFs and BoCCI species which nest, roost and forage within bog habitats including red grouse and snipe.

5.6.3.6 Freshwater Ecology

The effectiveness of the freshwater ecology mitigation measures will be verified through implementation of the Water Quality Monitoring Plan and ongoing monitoring requirements contained within the CEMP and SWMP (**Annex 3.4**). This will include regular inspection and maintenance of the surface water management system, together with pre-construction, construction and post-construction water quality monitoring, to ensure that the drainage system is functioning effectively and that downstream water quality is protected.

5.6.3.7 Amphibians and Reptiles

No mitigation measures are necessary for common lizard and smooth newt as the impacts of the project are not considered likely to be significant. However, over time and on completion of construction works, actions proposed within the HMP are likely to have positive impacts on the local herpetofauna population.

5.6.3.8 Invertebrates

The turves containing marsh fritillary larval webs will be translocated to the area east of T1, which supports abundant devil's-bit scabious. This approach will need further refinement alongside NPWS (likely derogation), to ensure the microclimate is appropriate. The condition of the habitat was assessed as suitable under-grazed. The area is likely unsuitable for grazing as it is located in a deep depression resulting from historic turf cutting. As such, the habitat can be improved and enhanced for marsh fritillary by:-

- Removing the encroaching scrub and non-native lodgepole pine saplings; and,
- Trimming some areas of the grassy sward to improve structural diversity.

5.7 MONITORING MEASURES

Monitoring is an essential element of any management and enhancement process, as it is important to determine whether applied measures are successfully contributing to the achievement of objectives. Full details and a schedule table of proposed monitoring have been provided within the HMP (**Annex 5.3**) with key elements summarised below.

5.7.1 HABITATS

5.7.1.1 Habitat monitoring of Annex I habitat type 7130* Blanket bog – pre-construction, construction and post-construction

Pre-construction, ten permanent quadrats (2m x 2m squares) will be set up within the area of Annex I habitat type 7130* Blanket bog between T01 and T10 for long-term vegetation monitoring. To ensure quadrates can be relocated on subsequent visits, accurate grid references on the south-west corner of the square will be taken. Quadrats will be located c. 50m from the project, within viable areas of Annex I habitat type 7130* Blanket bog where possible. This will allow to monitor for indirect impacts of the project over time.

Baseline conditions will be established pre-construction and for each quadrat:-

- Photographs will be taken to visually document any changes in site conditions over time;
- Vegetation type will be recorded;
- All species present will be listed, together with an indication species abundance, both in terms of % cover and rating on the DOMIN scale;
- The presence of both positive and negative indicator species for the habitat type will be noted; and,

- Other factors including peat depth, vegetation height, ground conditions and management will be recorded.

During construction, surveys will be undertaken to ensure that the habitat is not impacted by construction works. Post-construction surveys will be undertaken in Years 1, 2, 3, 5 and 10. Surveys will be undertaken by a suitably qualified botanist and at the optimal time of year for surveying peatland habitats.

5.7.2 PRE-CONSTRUCTION MONITORING FOR TERRESTRIAL MAMMALS

To aim to avoid accidental disturbance to the resting places of protected mammals, during the construction phase of the project, including badger, otter, red squirrel and pine marten; prior to works commencing these will be preceded by a due diligence ecological walkover survey of the proposed works corridor, including the electricity line route and bat feature buffers.

5.7.3 MONITORING MEASURES FOR BIRDS

Ornithological monitoring surveys will as per Scottish Natural Heritage (2009) guidance, will be undertaken post-construction in years 1, 2, 3, 4, 5, 10 and 15. As species have been identified as risk of collision carcass searching will form part of the ornithological post construction monitoring. Predicted collisions for IEF species are very low, other than for golden plover during the non-breeding season.

Post-construction monitoring will include carcass searches to assess observed collision rates and compare these against collisions predicted in CRM, subject to land access, health and safety requirements, and the findings of the adaptive monitoring programme. Monthly carcass searches will be carried out at operational turbines using trained sniffer dogs. In line with guidance on conducting bird carcass searches at onshore wind farms (NatureScot, 2009 and Caryl *et al.*, 2016) searches will be undertaken at a proportion of operational turbines within a defined search radius surrounding each selected turbine. Based on the turbine dimensions and the medium to large size of species likely to be present within the project site, carcass searches of 50% of operational turbines within a 100 m radius of each selected turbine is considered appropriate.

Roosting Raptor Surveys will be undertaken to understand operation phase impacts and habitat management on hen harrier. Surveys for roosting hen harrier will follow NatureScot (2025) guidance and use methods outlined by Hardey *et al.* (2013). Surveys should cover the project site and a 500m buffer. Monitoring will be undertaken in years 1-3, 5, 10 and 15 in line with NatureScot monitoring guidance (2009).

5.7.4 MONITORING MEASURES FOR BATS

5.7.4.1 Pre-construction assessment to implement root protection area (RPA)

A pre-construction assessment of hedgerows, treelines and woodland adjacent to works corridor, targeting sections that will be retained post-construction, will be undertaken by an appropriately qualified arboriculturist. This will identify Root Protection Areas (RPAs) if present, where construction activities will be limited, excavation and compaction in particular, to avoid impacts on the health of trees/shrubs adjacent to the works corridor.

5.7.4.2 Monitoring of bat buffers

The aim for bat feature buffers around turbines is to ensure that habitats are as featureless as possible to avoid bats flying next to operating turbines. NatureScot guidance also recommends a three-year post-construction monitoring program for bats, involving monitoring in each of the first three years to assess the effectiveness of the bat feature buffers.

Initially, regular monitoring will be conducted in years 1, 2 and 3 post-construction to ensure that vegetation clearance measures and ongoing management efforts result in the desired habitat conditions. Following the initial three-year monitoring period, habitat-feature buffers will continue to be maintained through the Habitat Management Plan.

Annual compliance checks in spring (April) and late summer (August) will be undertaken during the first three years of the operational phase. Thereafter, periodic inspections at intervals of up to 10 years will be undertaken to ensure that habitat-feature buffers are maintained in suitable condition. The three-year post-construction monitoring program will also include bat activity monitoring using static detectors and carcass searching.

Bat activity monitoring in years 1, 2 and 3 will involve three seasonal deployments of five static bat detectors operating for a minimum of 10 nights under compliant weather conditions. Four detectors will be deployed with one at each of the turbine locations. Deployment will cover the following periods:-

- early May and mid-June;
- mid-June and mid-August; and,
- early September.

A continuously recording bat detector will be deployed at height, operating between the start of May and the end of October, to simultaneously monitor bat activity at ground level (c. 2m) and at height (c. 50m). Similar to pre-construction surveys, weather data will be collected. This can be supplemented with wind speed data collected from wind turbines.

5.7.4.3 Bat Carcass Searches

Whilst the assessment predicts no significant residual effects on bats, Article 12(4) of the Habitats Directive requires monitoring of incidental fatalities of Annex IV species such as bats. The project also provides an opportunity to gain baseline data on bat/turbine interaction, and will be monitored for activity levels and potential bat fatalities during years 1, 2, 3 post construction. The requirement for any additional monitoring thereafter should be informed by the findings of the initial monitoring period and discussed with the relevant regulatory authorities where necessary. A comprehensive onsite fatality monitoring programme is to be undertaken. The primary components of the mortality programme are outlined below:-

- Carcass removal trials to establish levels of predator removal of possible fatalities. This will be done following best recommended practice and with due cognisance of published effects such as predator swamping, whereby excessive placement of carcasses increases predator presence and consequently skews results. No turbines which are used for carcass removal trials will be used for subsequent fatality monitoring;

- Turbine searches for fatalities will be undertaken following best practice in terms of search area (minimum search radius equivalent to hub height) and at intervals selected to effectively sample fatality rates as determined by carcass removal trials in above;
- A standardised approach with a possible control group and/or variation in search techniques such as straight line transects/randomly selected spiral transects/dog searches will be undertaken. This will provide a means of robustly estimating the post construction collision fatality (if any); and,
- Recorded fatalities will be interpreted alongside carcass persistence and searcher-efficiency data to provide an estimate of overall fatality rates.

5.7.5 MONITORING OF WATER QUALITY DURING CONSTRUCTION

In order to verify the efficacy of pollution prevention and mitigation works during construction, water quality monitoring is required. Baseline monitoring will be undertaken prior to construction, with construction-phase monitoring undertaken by the appointed contractor's Environmental Manager or suitably qualified specialist. Monitoring will be conducted prior to, during and following completion of construction works. Survey locations will target watercourses within the catchments of the construction areas and monitoring will comprise visual inspections, field hydrochemistry and grab sampling.

Annex 3.4 (CEMP) provides the outline scope for water quality monitoring, including:-

- At least one baseline monitoring visit.
- Daily visual observation undertaken by the appointed contractor environmental manager in areas of high construction activity or during high rainfall periods to identify any evidence of siltation, oil or silt. Visual inspections will include details of the colour of the water at the time of inspection.
- Weekly visual inspections and monthly field hydrochemistry monitoring.
- One round of post construction monitoring.
- Parameters for hydrochemistry analysis will include the following:-
 - pH;
 - Temperature;
 - Total Suspended Solids (TSS);
 - Dissolved Organic Carbon (DOC);
 - Conductivity;
 - Dissolved Oxygen (DO);
 - Total Oxidised Nitrogen (TON);
 - Ammoniacal Nitrogen;
 - Ammonia;
 - Potassium;
 - Phosphate;
 - Biological Oxygen Demand (BOD);
 - Chemical Oxygen Demand (COD); and,
 - Total Petroleum Hydrocarbons (TPH) only during construction phase.

5.7.6 MONITORING MEASURES FOR MARSH FRITILLARY

Habitat condition assessments and larval web surveys will be carried out in accordance with best practice guidance in Year 1, 3, 5, 10 and then for repeated 5-year increments for the lifetime of the project. Full details are listed in the Habitat Management Plan (**Annex 5.3**).

5.8 RESIDUAL EFFECTS

5.8.1 CONSTRUCTION PHASE

Residual effects are those which are likely to occur even following the implementation of mitigation measures. See **Table 33**, which summarises residual effects occurring within the project site on IEFs assessed in this chapter.

While mitigation measures will reduce and alleviate likely significant effects, some temporary residual effects may occur during the construction phase that cannot be fully mitigated against. These include temporary habitat loss of hedgerows and treelines until replacement planting is re-established, temporary habitat loss for mammals until Temporary Construction Compounds are decommissioned and hedgerows and trees are re-established.

5.8.1.1 Designated Sites

The NIS prepared for the project provides mitigation measures to ensure there are no remaining integrity level effects on the Qualifying Interests (QIs) for Tullaghanrock bog SAC, Callow bog SAC, River Moy SAC, and Lough Gara SPA (See NIS - APEM Group Woodrow, 2026). The project is not likely to have significant residual effects on designated sites.

5.8.1.2 Habitats

(FW4) Drainage ditch

There will be a residual negative impact on the (FW4) Drainage ditch habitat as a result of the project. However, similar habitat elsewhere within the immediate vicinity (c. 100m) of where the (FW4) Drainage ditch habitat will be lost will still be available. Where these features occur in bog habitat the loss of surface drainage can also benefit the adjacent habitat. As a result, residual habitat-related effects are not likely to be significant.

(PB2) Upland blanket bog

Permanent direct and indirect loss of (PB2) Upland blanket bog will constitute a residual effect even when the HMP is taken into account (**Annex 5.3**). The proposed actions within the HMP include effective restoration measures for peatland habitats. These include forest to bog restoration with the objective of re-establishing bog vegetation in afforested areas, and more widescale hydrological restoration measures aimed to slowing further degradation of bog habitats.

(PB4) Cutover bog

Permanent direct and indirect loss of (PB4) Cutover bog will constitute a residual effect even when the HMP is taken into account (**Annex 5.3**). The proposed actions within the HMP include effective restoration measures for peatland habitats but also options that serve primarily to slow further degradation. As a result, residual habitat-related effects (both positive and negative) are likely to be significant at a *County and Local (higher) level*.

(WN7) Bog woodland

The replanting of (WN7) Bog Woodland on the project site will aim to offset habitat loss associated with the project. Similar native species will be used, as detailed in the HMP (**Annex 5.3**). Consequently, residual habitat-related effects are not likely to be significant.

(WL1) Hedgerow and (WL2) Treelines

The replanting of (WL1) Hedgerows and (WL2) Treelines on-site will serve to offset habitat loss associated with the project. Any hedgerows that require removal will be reinstated using similar native species (see **Annex 5.3** for details). Where permanent loss of hedgerow occurs, compensatory planting will be undertaken in more suitable locations. The layout of re-instated hedgerows will be designed to guide bats away from the proposed works and reduce future disturbance impacts. Ongoing habitat monitoring and implementation of the HMP will ensure that no significant adverse effects persist. As a result, residual habitat-related effects are not likely to be significant.

(WS1) Scrub

Current climatic and herbivore levels are not suppressing the succession of areas from open bog to localised scrub habitat, especially where the hydrology has been modified by drainage. Even with the restoration of a more natural hydrology in places with drain blocking, the environmental conditions would be expected to continue to allow natural succession of areas to scrub offsetting the temporary loss, and therefore no active interventions are proposed. As a result, residual habitat-related effects as a result of scrub loss are deemed not likely to be significant.

5.8.1.3 Terrestrial Mammals

Following the implementation of mitigation to avoid disturbance upon terrestrial mammals provided in **Section 5.6.1.4**, there will be no significant effects on this IEF.

5.8.1.4 Bats

Bat Habitat Loss

Through avoidance during the design stage, there will be no removal of features determined to house roosting bats such as the transitional roost (F.1) identified during surveys. With the implementation of mitigation measures outlined above, there will be no residual significant effects on bat roosting, foraging or commuting habitats due to habitat removal associated with the installation of the turbines and associated works.

Hedgerow removal and replanting will have a short-term (approximately 5 years) negative effect on foraging and commuting habitat for bats which effect will be significant at a local geographical scale. This effect will be mitigated by carrying out compensatory planting prior to removal of vegetation, where possible, and this effect will end once replanting has matured (see **Annex 5.3**, HMP). In the long term, with the maturation of the replanting mitigation, there will be no residual significant effect on any geographic scale from hedgerow removal during the construction phase

Bat disturbance and displacement with Artificial Lighting at Night (ALAN)

Carrying out construction work during the daylight hours avoids having any indirect impact on bats caused by ALAN. With the implementation of mitigation measures outlined to avoid light spill on bat foraging and commuting areas, there will be no residual significant effect on the relevant light sensitive species, namely *Myotis* species and brown long-eared bat, during the construction phase.

5.8.1.5 Birds

No residual effects are anticipated following implementation of embedded mitigation and HMP measures (see **Annex 5.3** for details).

5.8.1.6 Aquatic Ecology

Mitigation measures outlined in the CEMP & SWMP (**Annex 3.4**), NIS and in **Chapter 7** (Water) have aimed to result that no significant residual effects on aquatic ecology remain. Appropriate water quality protection, disturbance reduction and reducing the potential risk of invasive alien species affecting aquatic ecology will ensure that residual effects relating to aquatic ecology are not significant.

5.8.1.7 Invertebrates

Taking a precautionary approach, it is considered that the residual effects on marsh fritillary could be significant at a *County Level*, as translocations have a high rate of failure and are not supported by Butterfly Conservation Ireland as a mitigation measure.

Habitat loss and fragmentation can lead to the formation of smaller, more isolated local populations, which in turn undermine the long-term stability of the metapopulation. As connectivity decreases, the metapopulation becomes less resilient to stochastic events and increasing the risk of regional decline or extinction.

This will in some way be mitigated by the implementation of action taken by the suitably qualified ECoW through pre-construction survey and on-going monitoring with allowance for seasonal restrictions during works at T10. However, the current assessment is that there will be County Level residual impact on this species as a result of the construction of T10.

5.8.2 OPERATION PHASE

5.8.2.1 Birds

No residual effects are anticipated following implementation of embedded mitigation and HMP measures.

5.8.2.2 Bats

Collision and barotrauma

Soprano and common pipistrelle regularly forage close to hedgerows and treelines, particularly during periods of higher winds and precipitation. With the implementation of mitigation measures and embedded mitigation including bat buffers, the suitability of habitat immediately surrounding turbine locations for foraging and commuting by these species will be reduced, therefore there will be no residual significant effect due to collision and barotrauma for pipistrelle species during the operation phase.

Even after the implementation bat buffer mitigation measures, Leisler's bat can still be at some risk from collision impacts due to their flight behaviour, as they like to commute and forage over open areas. Leisler's bat may continue to utilise areas of open habitat and woodland-edge habitat where suitable foraging and commuting opportunities remain available. The likelihood of collision impacts will be reduced through implementation of the vegetation buffers described in **Table 32 Section 5.6.1.5**.

Therefore, there will be no residual significant effect due to collision for Leisler's bat at any geographic scale during the operation phase.

Lighting

Permanent ground-level lighting associated with the proposed development will be limited to the electricity substation location. The mitigation measures in place will minimise the duration and extent of lighting exposure experienced by foraging bats such as screening planting and motion sensor-based security lights. Given that light spill on to the adjacent feature will be avoided, it will be controlled by motion-activated lighting, and that bat activity recorded at the nearest survey location was low, there will be no residual significant lighting effect on bats at the local geographic scale during the operation phase.

5.8.2.3 Invertebrates

No residual negative effects are predicted during the operation phase. On-going habitat management and enhancement of the translocation site for marsh fritillary to the east of T1, should result in a positive residual effect on the condition of the habitat and suitability for marsh fritillary as outlined in **Annex 5.3**.

5.8.3 DECOMMISSIONING PHASE

With the implementation of mitigation measures, there will be no likely residual significant effect during the decommissioning phase. Returning the project site back to its pre-construction natural condition will result in a likely significant positive effect on terrestrial mammals, birds, bats, and aquatics through the re-establishment of habitat connectivity, reduction in disturbance and lighting and protection of water quality. The peatland habitats (PB2) Upland blanket bog and (PB4) Cutover bog are considered "*irreplaceable habitats*" and cannot be reinstated to pre-construction baseline levels (CIEEM, 2024:32). As such, the decommissioning phase will have a significant adverse impact on these habitat types. The likely maximum area of impact upon such habitat is c. 21.54ha during decommissioning of the project site.

Negative residual effects on all remaining IEFs for the decommissioning phase are assessed as being not significant.

Important Ecological Feature (IEF)	Project Phase	Significance of Effect in the Absence of Mitigation	Proposed Mitigation	Residual Effect
European Sites (SPAs and SACs)	Construction	Potential Significant Effect arising from habitat disturbance, sediment release and pollution pathways to qualifying interests.	CEMP, pollution prevention, drainage controls, buffer zones and ECoW supervision.	No significant effects.
	Operation	Potential Significant Effect through hydrological changes and disturbance pathways.	Sensitive design, habitat restoration through Habitat Management Plan (HMP) and monitoring.	No significant effects.
	Decommissioning	Potential Significant Effect through disturbance and sediment release.	Decommissioning EMP, pollution prevention and habitat reinstatement.	No significant effects.
Annex I Peatland Habitats and Habitats of Conservation Importance	Construction	Major Adverse due to habitat loss (see Section 5.5.4.2 Table 32), fragmentation and degradation.	Micrositing, reduced land-take, peat management and habitat restoration.	Minor Adverse to Negligible Adverse immediate effect during construction
	Operation	Moderate Adverse due to long-term habitat modification.	Habitat Management Plan (HMP) including peatland restoration.	Minor Beneficial potential for significant positive impact if all HMP measures are successfully implemented).
	Decommissioning	Moderate Adverse due to temporary disturbance.	Habitat reinstatement and restoration.	Negligible Adverse to Minor Beneficial.
Protected species including mammals (e.g. otter, badger, red squirrel and pine marten) and herpetofauna	Construction	Moderate Adverse due to disturbance and injury risk.	Pre-construction surveys, Ecological Clerk of Works (ECoW), exclusion zones and protection plans (Method Statements where required).	Negligible Adverse. Not Significant.
	Operation	Minor Adverse due to ongoing disturbance.	Retention of habitat corridors and habitat management.	Negligible Adverse. Not Significant.
	Decommissioning	Moderate Adverse due to temporary disturbance.	Updated surveys and protection measures.	Negligible Adverse. Not Significant.

Bats	Construction	Moderate Adverse due to loss of commuting and foraging habitat.	Habitat retention, sensitive lighting and ecological supervision.	Minor Adverse to Negligible Adverse. Not Significant.
	Operation	Moderate Adverse due to collision risk and habitat alteration.	Embedded mitigation and monitoring.	Minor Adverse. Not Significant.
	Decommissioning	Minor Adverse due to temporary disturbance.	Sensitive working practices and reinstatement.	Negligible Adverse. Not Significant.
Ornithology	Construction	Minor Adverse due to disturbance and habitat loss.	Timing restrictions, pre-construction survey and exclusion buffers.	No significant effects.
	Operation	Minor Adverse due to collision risk and displacement.	Habitat Management Plan (HMP) including peatland restoration and following embedded mitigation principles for any large-scale works.	No significant effects.
	Decommissioning	Minor to Adverse due to temporary disturbance.	Timing restrictions, pre-construction survey and exclusion buffers.	No significant effects.
Freshwater Ecology (Aquatic Habitats, Fisheries and Watercourses)	Construction	Major to Moderate Adverse due to the potential for sedimentation, pollution incidents, hydrological alteration, habitat degradation and impacts on fish and aquatic macroinvertebrate communities.	Application of the CEMP; implementation of the Surface Water Management Plan (SWMP); adherence to pollution prevention measures; watercourse buffers; settlement ponds and drainage controls; supervised watercourse crossings; progressive reinstatement of disturbed ground; ecological and water quality monitoring where required.	Negligible Adverse to Minor Adverse. Not Significant.
	Operation	Minor to Moderate Adverse due to changes in runoff characteristics, ongoing drainage management and	Long-term drainage management; maintenance of water treatment infrastructure; habitat	Negligible Adverse. Not Significant.

		potential indirect effects on aquatic habitats.	restoration measures; monitoring and adaptive management where required.	
	Decommissioning	Moderate Adverse due to temporary disturbance, sediment mobilisation and pollution risk associated with infrastructure removal.	Decommissioning Environmental Management Plan; pollution prevention measures; drainage controls; ecological supervision; reinstatement of disturbed areas and restoration of natural drainage patterns.	Negligible Adverse. Not Significant.

Table 33: Residual Effects

5.9 CUMULATIVE EFFECTS

The following developments within 20km of the Site, and which are understood to have the potential for source-pathway-receptor linkages, have been considered within the assessment of cumulative effects.

Development	Planning Register Reference	Development Description	Status
Hanly Quarries, County Roscommon	08/9 (An Coimisiún Pleanála Reference PL20.229770), 05/872, 08/1217, 08/474, 20/310 (An Coimisiún Pleanála Reference ABP-311614-21), 21/668, 22/17, 22/165 (An Coimisiún Pleanála Reference ABP-313866-22)) and 23/129 (An Coimisiún Pleanála Reference ABP-317461-23)	Quarry and all associated quarrying plant and machinery	Existing
Harrington Concrete and Quarries, County Mayo	83/1316, 88/69, 97/165 (An Coimisiún Pleanála Reference PL16.105239), 99/1888 (An Coimisiún Pleanála Reference PL16.127156), 00/1596 04/1843, 24/403, 24/542 and 25/60088	Quarry and all associated quarrying plant and machinery	Existing
Westlands Sand Quarry, County Mayo	00/3017	Quarry and all associated quarrying plant and machinery	Existing
Largan Hill Wind Farm, County Roscommon (0km to Site boundary, c. 250m to nearest turbine (T3))	94/582	9 no. wind turbines and all associated infrastructure	Existing
Leam Wind Farm, County Roscommon	21/595 (An Coimisiún Pleanála Reference ABP-314120-22)	2 no. wind turbines and all associated infrastructure	Permitted
Natural Forces Renewable Kilcash Energy Wind Turbine, County Roscommon	23/60142 (An Coimisiún Pleanála Reference ABP-319800-24)	1 no. wind turbine and all associated infrastructure	Permitted
Roosky Wind Farm, County Roscommon	03/341, 03/1400, 07/2255, 11/3055 and 13/3005	2 no. wind turbines and all associated infrastructure	Existing
Grady Joinery Wind Turbine, County Mayo	11/413 (An Coimisiún Pleanála Reference PL16.240083) and 18/222	1 no. wind turbine and all associated infrastructure	Existing
Riverstown Locally Owned Wind	23/60288 (An Coimisiún Pleanála Reference ABP-320302-24)	1 no. wind turbine and all associated infrastructure	Permitted

Turbine, County Sligo			
Carrigeen Wind Farm, County Roscommon	An Coimisiún Pleanála Reference ABP-322258-25	14 no. wind turbines and all associated infrastructure	Proposed
Ballyfeeny Green Energy Project, County Roscommon	Planning Register Reference 25/60446 (An Coimisiún Pleanála Reference PL20.502020)	6 no. wind turbines and all associated infrastructure	Permitted
N5 Ballaghaderreen to Scramoge Road Project	(An Coimisiún Pleanála Reference HA20.300493)	N5 Ballaghaderreen to Scramoge Road Development	
North Connaught 110kV Overhead Line Project (0km to Site boundary (underground electricity line route crosses the route of the 110kV project), 500m to nearest turbine (T10).)	An Coimisiún Pleanála Reference ABP-313724-22	59km of underground electricity line and associated works	Permitted
Overhead Electricity Lines	Various	110kV overhead electricity line	Existing
Electricity Substations	Various	110kV and 38kV substations and all associated infrastructure	Existing
Agricultural Developments	Various	Various	Existing, Permitted and Proposed
Residential Dwellings	Various	Various	Existing, Permitted and Proposed
Commercial Forestry Plantations	-	-	Existing
Turf Cutting	-	Turf cutting, drying and associated land drainage.	Existing

Table 34: List of developments considered in assessment of cumulative effects

5.9.1 INTRODUCTION

Cumulative effects may arise where the impacts of the proposed development act in combination with those of other existing, consented or reasonably foreseeable developments within the Zone of Influence (Zol), resulting in effects that are greater than those arising from the project alone. In accordance with CIEEM (2024), cumulative effects may be additive, synergistic or sequential and may occur through shared impact pathways such as habitat loss, habitat fragmentation, disturbance, hydrological change, deterioration in water quality and increased collision risk.

The cumulative assessment has considered the Important Ecological Features (IEFs) identified in **Table 34**, including designated sites, habitats, protected and notable species, freshwater ecology receptors, birds, bats, mammals, amphibians, reptiles and marsh fritillary butterfly. The assessment has also taken account of the iterative design

process, embedded mitigation and standard environmental controls incorporated into the project design.

The principal project identified within the wider landscape with the potential to contribute to cumulative ecological effects is the adjacent Largan Hill Wind Farm, together with existing forestry operations, peat extraction activities, agricultural land management practices, drainage networks and ancillary infrastructure occurring throughout the surrounding peatland landscape.

5.9.2 DESIGNATED SITES

Potential cumulative effects on designated sites may arise through the combined influence of multiple developments on water quality, hydrology, habitat condition and disturbance pathways. Existing peat extraction, commercial forestry, drainage activities and other infrastructure projects within the wider catchments have contributed to historical habitat modification and hydrological alteration across the receiving environment.

Without mitigation, there is potential for cumulative effects on hydrologically connected Natura 2000 sites, Ramsar sites and nationally designated sites through the combined release of suspended solids, nutrients or pollutants. However, implementation of standard drainage controls, pollution prevention measures, watercourse buffers, peat management measures and ecological supervision substantially reduces the likelihood of significant cumulative impacts.

Accordingly, no significant cumulative effects are predicted on the conservation objectives or integrity of internationally designated sites including River Moy SAC, Callow Bog SAC, Tullaghanrock Bog SAC, Lough Gara SPA or Lough Gara Ramsar Site. Likewise, no significant cumulative effects are predicted on NHAs or pNHAs. Further details can also be found in the NIS (APEM Group Woodrow, 2026).

5.9.3 HABITATS

The wider landscape has been subject to long-term peat extraction, drainage, afforestation and agricultural improvement, resulting in fragmentation and degradation of peatland habitats. The cumulative influence of these activities has reduced the extent and condition of blanket bog and associated peatland communities within the wider area.

The project will contribute additional habitat loss and fragmentation; however, these effects have been reduced through the iterative design process, avoidance of higher-value habitats where practicable and incorporation of habitat restoration measures. The greatest cumulative sensitivity relates to peatland habitats, including (PB2) Upland Blanket Bog and active peat-forming areas corresponding to Annex I habitat 7130* Blanket Bog.

Given the limited scale of habitat losses in the context of the wider resource, together with habitat restoration, including forest to bog habitat restoration and drain blocking, measures proposed through the Habitat Management Plan (**Annex 5.3**), cumulative effects on habitats are not considered significant beyond those already identified for the project alone.

5.9.4 TERRESTRIAL MAMMALS

Habitat connectivity for otter, badger, pine marten and other protected mammals is influenced by the broader landscape of drainage features, peatland habitats, scrub, woodland and hedgerows. Existing peat extraction, forestry operations and road infrastructure have contributed to habitat fragmentation within the wider area.

Construction and operational effects from the project may combine with these existing pressures through temporary disturbance, habitat loss and reduced habitat connectivity. However, sufficient alternative habitat remains available throughout the wider area and mammal populations are considered capable of continued movement through the landscape.

Following implementation of embedded mitigation and species protection measures, as well as habitat management (**Annex 5.3**) no significant cumulative effects are predicted for badger, pine marten, small mammals or otter populations.

5.9.5 BATS

Potential cumulative effects on bats may arise from the combined operation of existing, permitted and proposed wind energy developments within the wider landscape. These effects may include habitat loss or alteration, barrier effects to bat movement, and increased collision and barotrauma risk. Such effects are of relevance to species recognised as having a higher susceptibility to wind turbine impacts, including Leisler's bat (*Nyctalus leisleri*), common pipistrelle (*Pipistrellus pipistrellus*) and soprano pipistrelle (*Pipistrellus pygmaeus*).

The Proposed Development has incorporated a range of embedded mitigation measures, including species-appropriate bat buffers, turbine siting constraints, and the retention and protection of key habitat features, thereby minimising potential impacts on commuting and foraging bats. The highest levels of bat activity recorded during baseline surveys were localised to a small number of detector locations associated with plantation and plantation-edge habitats, while activity across the majority of the project site was low. Although cumulative collision risk cannot be entirely excluded, bat activity recorded across the site was generally low to moderate and extensive alternative foraging and commuting habitat is available throughout the surrounding landscape. No evidence was identified during baseline surveys to indicate that the project site supports regionally or nationally important concentrations of bats that would be expected to be particularly vulnerable to cumulative effects. Furthermore, measures to maintain and enhance habitat quality are included within the Habitat Management Plan (HMP) (Annex 5.3).

Taking account of the recorded activity levels, the availability of alternative habitat, the embedded mitigation measures, and the habitat enhancement proposals, cumulative effects on bat populations are not predicted to result in an adverse effect on the conservation status of bat species at the local, county or national scale. Accordingly, the residual cumulative effect is assessed as Not Significant.

5.9.6 BIRDS

Given the nature of the development, some of the most significant potential cumulative effects which have been identified are considered to be ornithological. These may arise as a result of the project through the combined operation of multiple wind farms within the wider landscape, resulting in collision risk, displacement, barrier effects and habitat loss for sensitive bird species.

Species considered most sensitive to cumulative effects include raptor, wader and grouse species.

The project site supports a nationally important non-breeding hen harrier resource associated with winter roosting activity and county-important populations of golden plover and snipe.

Potential cumulative effects for these species have been considered in conjunction with existing wind energy infrastructure within the region. Given the relatively low recorded flight activity within the turbine envelope for most species, the absence of breeding hen harrier territories within the Study Area, the limited habitat loss proposed, and the implementation of species-specific mitigation, cumulative effects are not predicted to adversely affect the conservation status of the assessed bird populations.

No significant cumulative effects are therefore predicted for ornithological IEFs and further details are provided in **Section 5.9.6**.

Further Details on the Cumulative Impact Assessment for Birds

The potential for cumulative effects has been considered on avian IEFs. As the impacts on receptors from the project in isolation are minimal on the majority of species, the cumulative assessment only considers those species where the level of effect in isolation has the potential to materially contribute to a significant effect. Consequently, the cumulative assessment considers only golden plover, hen harrier and snipe.

Small-scale residential and agricultural developments are unlikely to contribute to significant cumulative effects owing to their small-size, while ongoing forestry, overhead line and quarry operations are considered part of the baseline conditions and not considered. Where a wind farm is operational, then displacement associated with these developments is considered part of the baseline conditions and not considered to contribute to cumulative effects.

No baseline survey information or more recent monitoring data was available for Largan Hill Wind Farm which is immediately adjacent to the west of the project site. Given the proximity of the development to the proposed development, a number of the baseline surveys undertaken also cover this site (at least in part) and it has been considered as part of the baseline environment. There is the potential for disturbance during routine maintenance or decommissioning, however this would be short-term and reversible and therefore extremely unlikely to contribute to a significant effect.

No documents for Roosky Wind Farm or Grady Joinery Wind Turbine could be found, and therefore these have not been considered in detail. However, due to the small size of these developments (1-2 turbines) the potential for collision and displacement effects is negligible and that detailed assessment is rarely required for developments of this size. It is assessed that these are extremely unlikely to materially contribute to a significant effect.

N5 Ballaghaderreen to Scramoge Road Project

Hen harrier and golden plover were not recorded during baseline surveys. Although snipe was recorded, it was not considered during the impact assessment. Therefore, there is no potential for this project to contribute to cumulative effects.

Riverstown Wind Turbine

No important avian species were recorded during baseline surveys for this project, and no impacts predicted. Therefore, there is no potential for this project to contribute to cumulative effects.

Leam Wind Farm

Predicted displacement effects were low, and no displacement was predicted for golden plover, hen harrier or snipe. There were no predicted collisions for golden plover. Therefore, there is no potential for this project to contribute to cumulative effects.

Kilcash Energy Wind Turbine

Snipe was recorded occasionally in small numbers during the non-breeding season only, with no predicted collisions or any other effects predicted for this species. Hen harrier was not recorded during any baseline surveys undertaken.

Golden plover was recorded during the non-breeding season, with a peak flock size of 145 birds present. Habitat loss and small-scale displacement was predicted, however as the project is a single turbine, impacts were considered minimal. Annual collisions were predicted to total 0.646 birds per year.

Carrigeen Wind Farm

Golden plover was not recorded during any baseline surveys for the project. A small number of snipe flights were recorded, with records during the breeding and non-breeding season distribution surveys. Habitat loss of slight significance and operational disturbance/displacement of low significant were predicted.

Hen harrier was recorded occasionally including roosts more than 1.5km from the project site. Impacts of slight significance were predicted during construction and very low significance during the operation phase with the project site not a key foraging area. Residual significant effects for these species were considered very low to low.

Ballyfeeny Wind Farm

Hen harrier was recorded rarely during surveys with no evidence of breeding and impacts were considered imperceptible. Snipe was recorded rarely and not assessed as a species of importance.

Golden plover was recorded during the breeding season only, with an estimated 0.03 collisions per year (during the breeding season). No other impacts were predicted for this species.

5.9.7 FRESHWATER ECOLOGY AND FISHERIES

Potential cumulative effects on freshwater ecology may arise through the combined effects of peat extraction, forestry operations, agricultural runoff, drainage modification and infrastructure development within the Owengarve and Lung catchments.

The principal cumulative pathways include:

- Increased suspended sediment loading;

- Nutrient enrichment;
- Hydrological alteration;
- Loss of riparian habitat;
- Barrier effects to aquatic species; and
- Accidental pollution events.

The project contains embedded water quality protection measures, drainage controls and pollution prevention measures designed to minimise these risks. Although the wider catchments already show evidence of slight diffuse pressures, the project is not expected to materially alter catchment-scale ecological status following mitigation, including site and habitat management (**Annex 3.4** and **5.3**).

Accordingly, no significant cumulative effects are predicted for aquatic habitats, fish communities, white-clawed crayfish, salmonid habitats or downstream qualifying interests associated with the River Moy SAC.

5.9.8 AMPHIBIANS AND REPTILES

The wider peatland landscape supports extensive habitat suitable for common lizard and smooth newt. Existing land management activities have already modified parts of this habitat through drainage and peat extraction.

In the absence of mitigation, the project will contribute a relatively small additional loss of habitat and the species are expected to persist within the extensive surrounding habitat resource. Consequently, no significant cumulative effects are predicted for common lizard or smooth newt populations.

5.9.9 MARSH FRITILLARY

Marsh fritillary habitat within the project area is limited in extent and occurs within a wider landscape affected by drainage, scrub succession and habitat fragmentation. These existing pressures represent the principal cumulative threat to the species.

In the absence of mitigation, the project has the potential to contribute to these pressures through habitat loss and fragmentation. However, restoration, habitat management and species-specific mitigation measures are proposed to offset these impacts. Considering the limited extent of occupied habitat affected and the absence of ecological connectivity with the nearest SAC population, significant cumulative effects on marsh fritillary are not predicted.

5.9.10 CONCLUSION

Taking account of the iterative design process, embedded mitigation, proposed restoration measures and standard environmental controls, the project is not predicted to result in significant cumulative effects on any Important Ecological Feature. Residual cumulative effects are expected to be negligible to minor adverse and will not affect the integrity, conservation status or long-term viability of designated sites, habitats or species populations within the wider study area.

5.10 CONCLUSION

This chapter has presented an assessment of the likely significant effects of the proposed development on biodiversity, including designated sites, habitats, freshwater ecology and fisheries, protected and notable species, and ecological processes. The assessment has been informed by a comprehensive programme of

desk study, habitat surveys, protected species surveys, ornithological surveys and aquatic ecology surveys, and has been undertaken in accordance with relevant legislation, policy and current ecological assessment guidance.

The iterative design process has been a key component of the assessment and has informed the evolution of the project design from an early stage. Through the application of the mitigation hierarchy, potential impacts have been avoided or reduced wherever practicable through careful siting of infrastructure, habitat avoidance, micro-siting allowances, sensitive drainage design and the incorporation of embedded mitigation measures within the project design.

The assessment has identified that, in the absence of mitigation, the proposed development has the potential to result in effects on designated sites, peatland habitats, freshwater ecology receptors and a range of protected and notable species. However, the implementation of the proposed mitigation measures, including the Construction Environmental Management Plan (CEMP), Surface Water Management Plan, Pollution Prevention Measures, Habitat Management Plan (HMP), Peat Management Plan and species-specific protection measures, will ensure that potential impacts are appropriately avoided, reduced or managed for all potential receptors (see **Annex 3.4** and **Annex 5.3**).

Following the application of mitigation, no significant adverse effects are predicted on the integrity or conservation objectives of any European site, either alone or in combination with other plans and projects. Similarly, no significant residual effects are predicted for nationally designated sites, freshwater ecology receptors, protected mammals, bats, amphibians, reptiles or marsh fritillary populations.

Residual effects on habitats, including peatland habitats of conservation importance, have been minimised through the iterative design process and will be further reduced through habitat restoration and enhancement measures proposed as part of the Habitat Management Plan. Where residual habitat losses remain, these are predominantly related to hydrological impacts resulting in localised indirect habitat loss. These are assessed as likely to have a minor impact on the conservation value, integrity or long-term viability of the habitats concerned within the wider landscape context and, with the successful implementation and monitoring of the HMP actions, these effects are likely to reduce overtime.

With respect to ornithology, the assessment has considered potential disturbance, displacement, habitat loss, barrier effects and collision risk for breeding and non-breeding bird species. Impacts have been limited as much as possible through sensitive design; and following implementation of mitigation and the Habitat Management Plan, residual effects are not predicted to adversely affect the conservation status of any bird population at a local, regional or national level. No significant effects are predicted for any receptors from the proposed project in isolation.

The cumulative effects assessment has also considered the potential for the proposed development to act in combination with other existing, consented and reasonably foreseeable developments within the wider area. Taking account of the mitigation measures and environmental controls proposed, no significant cumulative effects are predicted for any Important Ecological Feature.

Overall, the assessment concludes that, with the implementation of embedded design and mitigation, the proposed development can be constructed, operated

and decommissioned without resulting in significant adverse effects on biodiversity. Subject to the effective implementation of the mitigation measures, ongoing monitoring of the measures, and habitat management measures set out within this chapter (and **Annex 5.3**), the proposed development is assessed to, overall, pose minor, temporary adverse effects on biodiversity and long-term potentially positive effects on habitats and the fauna they support. Therefore, with the successful implementation of all ameliorative actions, the project is assessed to be acceptable from an ecological perspective and complies with relevant biodiversity conservation objectives and environmental assessment requirements.

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