

6. BIODIVERSITY

6.1 Introduction

This chapter assesses the likely significant effects (both alone and cumulatively with other projects) that the Proposed Development may have on Biodiversity, Flora and Fauna (with the exception of avian receptors, which are specifically dealt with in Chapter 7) and sets out the mitigation measures proposed to avoid, reduce or offset any potential significant effects that are identified. The residual impacts on biodiversity are then assessed. Particular attention has been paid to species and habitats of ecological importance, as well as any role they may play in providing a supporting network for European Sites and their QIs and SCIs. These include species and habitats with national and international protection under the Wildlife Acts 1976-2021 and the EU Habitats Directive 92/43/EEC. Impacts on avian receptors are considered in Chapter 7 of this EIAR. The full description of the Proposed Development is provided in Chapter 4 of this EIAR.

The chapter is structured as follows

- The Introduction provides a description of the legislation, guidance and policy context applicable to Biodiversity, Flora and Fauna.
- This is followed by a comprehensive description of the ecological survey and impact assessment methodologies that were followed to inform the robust assessment of likely significant effects on ecological receptors.
- A description of the Baseline Ecological Conditions and Receptor Evaluation is then provided.
- This is followed by an Assessment of Effects which are described with regard to each phase of the Proposed Development: construction phase, operational phase and decommissioning phase. Potential Cumulative effects in combination with other projects are fully assessed.
- Proposed mitigation and best practice measures to avoid, reduce or offset the identified effects are described and discussed. This is followed by an assessment of residual effects taking into consideration the effect of the proposed mitigation and best practice measures.
- The conclusion provides a summary statement on the overall significance of predicted effects on Biodiversity, Flora and Fauna.

The following defines terms utilised in this chapter:

- Where the 'Proposed Development' is referred to, this relates to all the project components described in detail in Chapter 4 of this EIAR.
- Where 'the site' is referred to, this relates to the lands as delineated by the EIAR Site Boundary in green as shown on Figure 6-1, which comprises the primary 'survey area' for the development.
- Where the 'Wind Farm' is referred to, this relates to all wind farm infrastructure as detailed in Chapter 4 and located in both the Northern and Southern Clusters.
- The 'Grid Connection' is referred to, this relates to all grid infrastructure, as detailed within Chapter 4, outside the Wind Farm site, within the local road network to Athlone 110 kV substation in Monksland.
- For the purposes of the Biodiversity assessment, some additional lands within the wider landowner ownership were included within the area to be referred to as the Survey Area for the purposes of this chapter. This additional land was surveyed so that the baseline condition of nearby turloughs, including Feacle turlough, could be taken into account within the impact assessment given the karst nature of the landscape and potential for groundwater connectivity from land within the EIAR Site

Boundary to these ephemeral waterbodies. The extended survey area to include these areas with nearby turloughs is shown in Figure 6-2.

- “Key Ecological Receptor” (KER) is defined as a species or habitat occurring within the zone of influence of the development upon which likely significant effects are anticipated.
- “Zones of Influence” (ZOI) for individual ecological receptors refers to the zone within which potential effects are anticipated. ZOIs differ depending on the sensitivities of particular habitats and species and were assigned in accordance with best available guidance and through adoption of a precautionary approach.



Map Legend

- EIAR Site Boundary
- Proposed Turbine Layout

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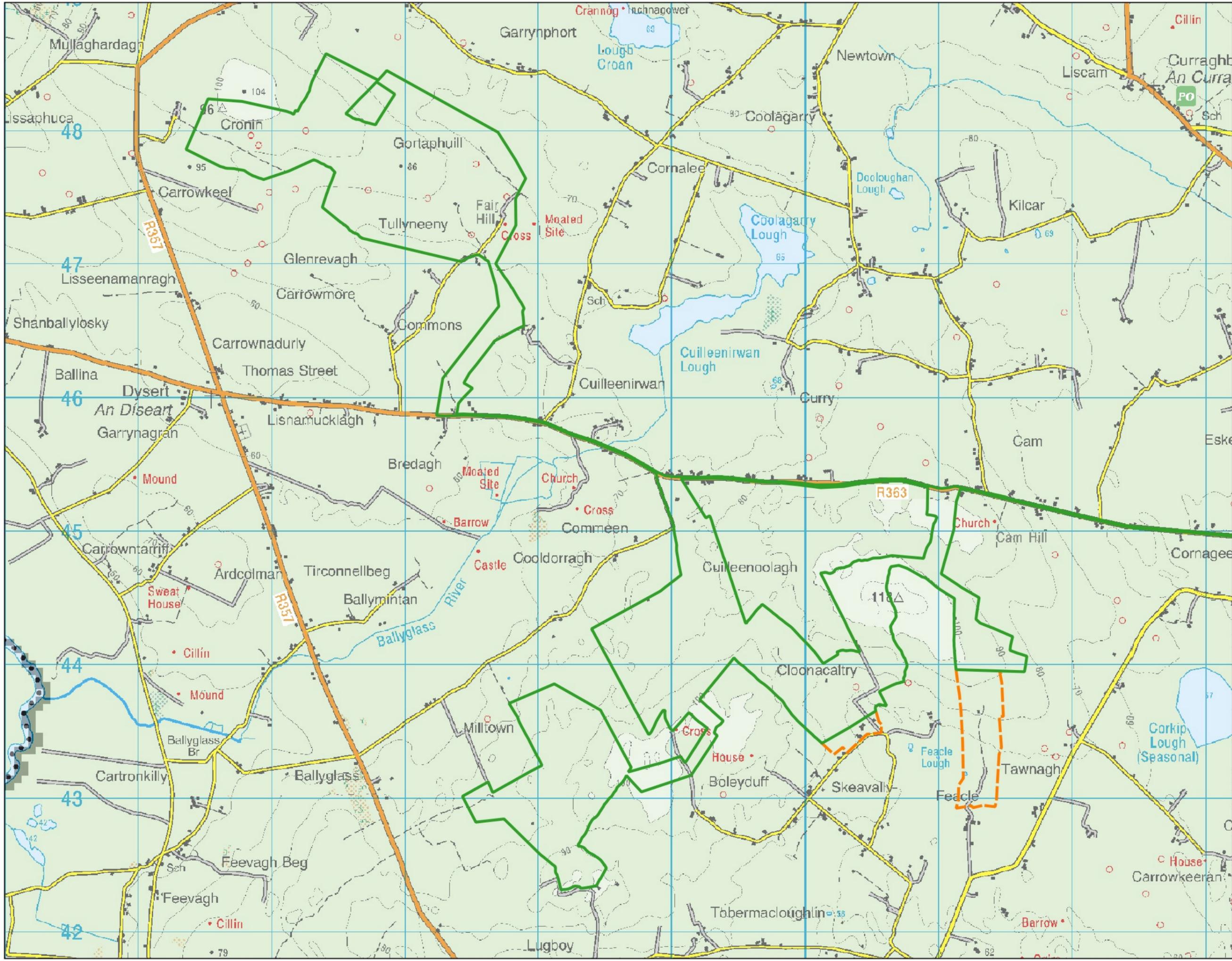


Site Location Map

Project Title	
Seven Hills Wind Farm, Co Roscommon	
Drawn By	Checked By
PE	JH
Project No.	Figure No.
190907	6-1
Scale	Date
1:60000	2022-06-01



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



Map Legend

- EIAR Site Boundary
- Extended Survey Area

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Extended Survey Area	
Project Title Seven Hills Wind Farm, Co. Roscommon	
Drawn By PE	Checked By JH
Project No. 190907	Figure No. 6-2
Scale 1:25000	Date 2022-06-01

MKO
 Planning and Environmental Consultants
 Turn Road, Galway
 Ireland, H91 VW84
 +353 (0)91 733611
 email: info@mkowind.ie
 Website: www.mkowind.ie

Requirements for Ecological Impact Assessment

European Legislation

The EU Habitats Directive (92/43/EEC) (together with the Birds Directive (79/409/EEC), as subsequently codified by Council Directive 2009/147/EC on the conservation of wild birds) forms the cornerstone of Europe's nature conservation within the EU. It is built around two pillars: the Natura 2000 network of protected sites and the strict system of species protection. The Habitats Directive protects over 1,000 animal and plant species and over 200 "habitat types" (e.g. special types of forests, meadows, wetlands, etc.), which are of European importance. The Habitats Directive and Birds Directive, which were transposed into Irish law inter alia through Part XAB of the Planning and Development Act 2000 (as amended) (from a land use planning perspective) recognise the significance of protecting rare and endangered species of flora and fauna, and more importantly, their habitats.

Annex I of the Habitats Directive lists habitat types whose conservation requires the designation of Special Areas of Conservation (SAC). Priority habitats, such as Turloughs, which are in danger of disappearing within the EU territory are also listed in Annex I. Annex II of the Directive lists animal and plant species (e.g. marsh fritillary, Atlantic salmon, and Killarney fern) whose conservation also requires the designation of SAC. Annex IV lists animal and plant species in need of strict protection such as lesser horseshoe bat and otter, and Annex V lists animal and plant species whose taking in the wild and exploitation may be subject to management measures. In Ireland, species listed under Annex V include Irish hare, common frog and pine marten. Species can be listed in more than one Annex, as is the case with otter and lesser horseshoe bat which are listed on both Annex II and Annex IV. The disturbance of species under Article 12 of the Habitats Directive (and in particular avoidance of deliberate disturbance of Annex IV species, particularly during the period of breeding, rearing, hibernation and migration and avoidance of deterioration or destruction of breeding sites or resting places) has been specifically assessed in this EIAR.

Council Directive 2009/147/EC on the conservation of wild birds (the "**Birds Directive**") instructs Member States to take measures to maintain populations of all bird species naturally occurring in the wild state in the EU (Article 2). According to Recital 1 of the Birds Directive, Council Directive 79/409/EEC on the conservation of wild birds was substantially amended several times and in the interests of clarity and rationality, the Birds Directive codifies Council Directive 79/409/EEC. Such measures may include the maintenance and/or re-establishment of habitats in order to sustain these bird populations (Article 3). A subset of bird species has been identified in the Directive and are listed in Annex I as requiring special conservation measures in relation to their habitats. These species have been listed on account of inter alia: their risk of extinction; vulnerability to specific changes in their habitat; and/or due to their relatively small population size or restricted distribution. Special Protection Areas (SPAs) are to be identified and classified for these Annex I listed species and for regularly occurring migratory species, paying particular attention to the protection of wetlands (Article 4).

National Legislation

The Wildlife Act, 1976–2021, is the principal piece of legislation governing protection of wildlife in Ireland. The Wildlife Act provides strict protection for species of conservation value. The Wildlife Act conserves wildlife (including game) and protects certain wild creatures and flora. These species are therefore considered in this report as ecological receptors. Natural Heritage Areas (NHAs) and Proposed Natural Heritage Areas (pNHAs) are heritage sites that are designated for the protection of flora, fauna, habitats and geological sites. Only NHAs are designated under the Wildlife (Amendment) Act 2017. The Appropriate Assessment ("AA") process, or screening for same, under Part XAB of the Planning Acts therefore does not apply to NHAs or pNHAs. pNHAs were published on a non-statutory

basis in 1995 but have not since been statutorily proposed or designated¹ However, these sites are considered to be of significance for wildlife and habitats as they may form statutory designated sites in the future (NPWS, 2020).

The Flora (Protection) Order, 2015 (S.I. No. 356 of 2015) lists the species, hybrids and/or subspecies of flora protected under Section 21 of the Wildlife Acts. It provides protection to a wide variety of protected plant species in Ireland including vascular plants, mosses, liverworts, lichens and stoneworts. Under Flora Protection Order it is illegal to cut, pick, collect, uproot or damage, injure or destroy species listed or their flowers, fruits, seeds or spores or wilfully damage, alter, destroy or interfere with their habitat (unless under licence).

National Policy

The National Biodiversity Action Plan 2017-2021 (Department of Culture, Heritage and the Gaeltacht, 2017) (the “**Plan**”) demonstrates Ireland’s continuing commitment to meeting and acting on its obligations to protect Ireland’s biodiversity for the benefit of future generations through a series of targeted strategies and actions. The main objective of the Plan is to bring biodiversity into the mainstream of policy and decision-making. Objective 1 (*Mainstream biodiversity into decision-making across all sectors*) of the Plan identifies the following relevant measures in relation to future developments:

- “Incorporate into legislation the requirement for consideration of impacts on biodiversity to ensure that conservation and sustainable use of biodiversity are taken into account in all relevant plans and programmes and relevant new legislation;
- Public and Private Sector relevant policies will use best practice in SEA, AA and other assessment tools to ensure proper consideration of biodiversity in policies and plans;
- All Public Authorities and private sector bodies move towards no net loss of biodiversity through strategies, planning, mitigation measures, appropriate offsetting and/or investment in Blue-Green infrastructure;
- Strengthen ecological expertise in local authorities and relevant Government Departments and agencies;
- Local Authorities will review and update their Biodiversity and Heritage Action Plans;
- Local Authorities will review and update their Development Plans and policies to include policies and objectives for the protection and restoration of biodiversity;
- Develop a Green Infrastructure at local, regional and national levels and promote the use of nature based solutions for the delivery of a coherent and integrated network;
- Continue to produce guidance on the protection of biodiversity in designated areas, marine and the wider countryside for Local Authorities and relevant sectors;
- Integrate Natura 2000 and Biodiversity financial expenditure tracking into Government Programmes internal paying agency management procedures including linkage to the Prioritised Action Framework and this NBAP;
- Develop a Natural Capital Asset Register and national natural capital accounts by 2020, and integrate these accounts into economic policy and decision-making;
- Initiate natural capital accounting through sectoral and small scale pilot studies, including the integration of environmental and economic statistics using the framework of the UN System of Experimental-Ecosystem Accounting (SEEA);
- Establish a national Business and Biodiversity Platform under the CBD’s Global Business Partnership;
- Ensure Origin Green produces tangible benefits for biodiversity with increased emphasis on conservation and restoration of biodiversity;

¹ <https://www.npws.ie/protected-sites/nha> (accessed 23 January 2020).

- Implement actions from Ireland’s Biodiversity Climate Change Sectoral Adaptation Plan;
- Identify and take measures to minimise the impact of incentives and subsidies on biodiversity loss, and develop positive incentive measures, where necessary, to assist the conservation of biodiversity;
- Establish and implement mechanisms for the payments of ecosystem services including carbon stocks, to generate increased revenue for biodiversity conservation and restoration;
- Develop and implement a National Biodiversity Finance Plan to set out in detail how the actions and targets of this NBAP will be delivered from 2017 and beyond; and
- Monitor the implementation of the Plan.”

Such policies have informed the evaluation of ecological features recorded within the EIAR Site Boundary and the ecological assessment process.

In summary, the species and habitats provided National and International protection under these legislative and policy documents have been considered in this Ecological Impact Assessment. A detailed assessment of the likelihood of the Proposed Development having either a significant effect or an adverse impact on any relevant European Sites (i.e. SACs, cSACs, SPAs or cSPAs) has been carried out in the Appropriate Assessment Screening Report and Natura Impact Statement (NIS). A separate assessment has not been carried out in this chapter, to avoid duplication of assessments. As per EPA Guidance 2022, “a biodiversity section of an EIAR, should not repeat the detailed assessment of potential effects on European sites contained in a Natura Impact Statement” but should “incorporate their key findings as available and appropriate”. However, the relevant conclusions of the AA Screening Report and NIS have been cross-referenced and incorporated.

6.3 Scoping/Review of Relevant Guidance and Sources of Consultation

The assessment methodology is based primarily upon the National Road Authority (NRA)’s Guidelines for Assessment of Ecological Impacts of National Road Schemes Rev 2 (NRA, 2009) (referred to hereafter as the NRA Ecological Impact Assessment Guidelines), and the survey methodology is based on the NRA Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes (NRA, 2009). Although these survey methodologies relate to road schemes, these standard guidelines are recognised survey methodologies that ensure good practice regardless of the development type.

In addition, the following guidelines were consulted in the preparation of this document to provide the scope, structure and content of the assessment:

- Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater and Coastal (CIEEM, 2018).
- Pollinator-friendly management of Wind Farms. All-Ireland Pollinator Plan, Guidelines 12. National Biodiversity Data Centre Series No. 26, Waterford. April 2021.

This assessment has been carried out in accordance with the Environmental Impact Assessment guidance as outlined in Chapter 1 of the EIAR.

In addition to the above, the following legislation applies with respect to habitats, fauna and water quality in Ireland and has been considered in the preparation of this report:

- The International Convention on Wetlands of International Importance especially Waterfowl Habitat (Concluded at Ramsar, Iran on 2 February 1971)

- S.I. No. 327 of 2012 - European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2012; S.I. No. 386 of 2015 - European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2015; S.I. No. 272 of 2009: European Communities Environmental Objectives (Surface Waters) Regulations 2009 and S.I. No. 722 of 2003 European Communities (Water Policy) Regulations 2003 which give further effect to EU Water Framework Directive (2000/60/EC)
- Planning and Development Act 2000 (as amended).

The following legislation applies with respect to non-native species:

- Regulation 49 and 50 of European Communities (Birds and Natural Habitats) (Amendment) Regulations 2021 (SI 293 of 2021)

This assessment has been prepared with respect to the various planning policies and strategy guidance documents listed below:

- Roscommon County Development Plan 2022-2028
- Consolidated Natura Impact Statement Report in support of the Appropriate Assessment on the Roscommon County Development Plan 2022-2028.

6.3.1 Statement of Authority

This EIAR chapter has been prepared by Patrick Ellison (B.Sc., M.Sc. ACIEEM). Patrick has over 6 years' professional ecological consultancy experience and is an Associate member of the Chartered Institute of Ecology and Environmental Management. This report has been reviewed by John Hynes (B.Sc., M.Sc., MCIEEM). John has over 10 years' experience in ecological management and assessment.

The baseline ecological surveys, including aquatic macroinvertebrate surveys were undertaken by David McNicholas (BSc., MSc., MCIEEM), Patrick Ellison (B.Sc., ACIEEM), Katie Pender (B.Sc.) Cathal Bergin (B.Sc.) and Rudraksh Gupta (B.Sc., M.Sc.). Dedicated fisheries and aquatic surveys were carried out by Ross Macklin of Triturius Environmental Ltd. on behalf of MKO.

Comprehensive bat surveys of the site were carried out by Aoife Joyce (BSc., MSc.), Luke Dodebier (BSc.), Rachel Walsh (BSc.), Katie Pender (BSc.) and Neil Campbell (BSc.). The final bat report was prepared by Aoife Joyce and reviewed by John Hynes (B.Sc., M.Sc., MCIEEM).

All surveyors have relevant academic qualifications and are competent experts in undertaking the ecological surveys in which they were involved.

6.4 Methodology

The following sections describe the methodologies followed to establish the baseline ecological condition of the Proposed Development site and all lands within the EIAR Site Boundary. Assessing the impacts of any project and associated activities requires an understanding of the ecological baseline conditions prior to and at the time of the project proceeding. Ecological Baseline conditions are those existing in the absence of proposed activities (CIEEM, 2018).

6.4.1 Desk Study

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

- Review of NPWS Article 17 maps 2019, 2013 and 2007.
- Review of online web-mappers: National Parks and Wildlife Service (NPWS), EPA (Envision), Water Framework Directive (WFD) and Inland Fisheries Ireland (IFI).
- Inland Fisheries Ireland (IFI) Reports, where available.
- Data on potential occurrence of protected bryophytes – as per NPWS online map viewer; Flora Protection Order Map Viewer – Bryophytes².
- Review of relevant Plans, including the National Biodiversity Action Plan 2017-2021, County Biodiversity Plan and the All Ireland Pollinator Plan 2021-2025.
- Review of the Bat Conservation Ireland (BCI) Private Database.
- Review of the publicly available National Biodiversity Data Centre (NBDC) web-mapper.
- Records from the NPWS web-mapper and review of specially requested records from the NPWS Rare and Protected Species Database for the hectads in which the Proposed Development is located.
- Potential for in-combination effects have been considered in Chapter 2 of this EIAR and Section 6.8 of this Chapter. This was informed by a review of the EIARs prepared for other plans and projects occurring in the wider area.

6.4.2 Scoping and Consultation

MKO undertook a scoping exercise during preparation of this EIAR, as described in Chapter 2, Section 2.4 of this EIAR.

Copies of all scoping responses are included in Appendix 2-1 of this EIAR. The recommendations of the consultees have informed the EIAR preparation process and the contents of this chapter. Table 2-7 in Chapter 2 of this EIAR describes where the comments raised in the scoping responses received have been addressed in this assessment. Table 6-1 provides a list of the organisations consulted with regard to biodiversity during the scoping process, and notes where scoping responses were received.

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

Table 6-1 Organisations consulted with regard to biodiversity

Consultee	Date of Response	Response Details	Section of EIAR where addressed
<p>Department of Agriculture, Food and the Marine (DAFM)</p>	<p>06.04.2021</p>	<p>If the Proposed Development will involve the felling or removal of any trees, the developer must obtain a Felling Licence from this Department before trees are felled or removed. A Felling Licence application form can be obtained from Felling Section, Department of Agriculture, Food and the Marine, Johnstown Castle Estate, Co. Wexford. Tel: 076-1064459, Web https://www.agriculture.gov.ie/forests-service/tree-felling/tre-efelling/</p> <p>A Felling Licence granted by the Minister for Agriculture, Food and the Marine provides authority under the Forestry Act 2014 to fell or otherwise remove a tree or trees and/or to thin a forest for silvicultural reasons. The Act prescribes the functions of the Minister and details the requirements, rights and obligations in relation to felling licences. The principal set of regulations giving further effect to the Forestry Act 2014 are the Forestry Regulations 2017 (S.I. No. 191 of 2017).</p> <p>The developer should take note of the contents of Felling and Reforestation Policy document which provide a consolidated source of information on the legal and regulatory framework relating to tree felling; https://www.agriculture.gov.ie/media/migration/forestry/tree-felling/FellingReforestationPolicy240517.pdf. As this development is within forest lands, particular attention should be paid to deforestation, turbulence felling and the requirement to afforest alternative lands.</p> <p>In order to ensure regulated forestry operations in Ireland accord with the principles of sustainable forest management (SFM), as well fulfilling the requirements of other relevant environmental protection laws, the Department (acting through its Forest Service division) must undertake particular consultations, and give certain matters full consideration during the assessment of individual Felling Licence applications. This includes consultation with relevant bodies, the application of various protocols and procedures (e.g. Forest Service Appropriate Assessment Procedure), and the requirement for applicants on occasion to provide further information (e.g. a Natura Impact Statement).</p> <p>Consequently, when the Forest Service is considering an application to fell trees, the following applies:</p> <ul style="list-style-type: none"> ➤ The interaction of these proposed works with the environment locally and more widely, in addition to potential direct and indirect impacts on designated sites and water, is assessed. Consultation with relevant environmental and planning authorities may be required where specific sensitivities arise (e.g. local authorities, National Parks & Wildlife Service, Inland Fisheries Ireland, and the National Monuments Service); 	<p>No felling of forestry will take place as a result of the Proposed Development. Assessment of impacts and measures to prevent, mitigate and compensate for potentially significant effects on ecological receptors is carried out in Section 6.7.</p>

		<ul style="list-style-type: none"> ➤ Where a tree Felling Licence application is received, the Department will publish a notice of the application before making a decision on the matter. The notice shall state that any person may make a submission to the Department within 30 days from the date of the notice. The notices for 2020 are published online at: https://www.agriculture.gov.ie/forestservation/publicconsultation/environmentalimpactassessment/enteiapublicconsultationforafforestationforeroad constructionandfellinglicences2020/ ➤ Third parties that make a submission or observation will be informed of the decision to grant or refuse the licence, and on request, details of the conditions attached to the licence, the main reasons and considerations on which the decision to grant or refuse the licence was based, and where conditions are attached to any licence, the reasons for the conditions. Both third parties and applicants will be also informed of their right to appeal any decision within 28 days to the Forestry Appeals Committee. Felling Licence decisions for 2020 are published online at: https://www.agriculture.gov.ie/forestservation/publicconsultation/environmentalimpactassessment-2020registerofdecisions/ <p>It is important to note that when applying to a Local Authority, or An Bord Pleanála, for planning permission where developments are:</p> <ol style="list-style-type: none"> a) subject to an EIA procedure (including screening in the case of a sub-threshold development) and any resulting requirement to produce an EIAR; and/or b) subject to an Appropriate Assessment procedure (including screening) and any resulting requirement to a Natura Impact Statement (NIS); and c) the Proposed Development in its construction or operational phases, or any works ancillary thereto, would directly or indirectly involve the felling and replanting of trees, deforestation for the purposes of conversion to another type of land use, or replacement of broadleaf high forest by conifer species, <ol style="list-style-type: none"> 1. that there is a requirement inter alia under the EIA Directive for an overall assessment of the effects of the project or the alteration thereof on the environment to be undertaken, including the direct and indirect environmental impact of the project; and 2. pursuant to Article 2(3) of the EIA Directive, the Department of Agriculture, Food and the Marine strongly recommends that, notwithstanding the fact that a parallel consent in the form of felling licence may also have to be applied for, any EIAR and/or NIS produced in connection with the application for planning permission to the Local Planning Authority or An Bord Pleanála, should include an assessment of the impact of and measures, as 	
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		appropriate, to prevent, mitigate or compensate for any significant adverse effects direct or indirect identified on the environment arising from such felling and replanting of trees, deforestation for the purposes of conversion to another type of land use, or replacement of broadleaf high forest by conifer species.	
An Taisce	-	No response received to date	N/A
Bat Conservation Ireland	-	No response received to date	N/A
Birdwatch Ireland	-	No response received to date	N/A
Department of Communications, Climate Action and the Environment	-	No response received to date	N/A
Department of Culture, Heritage and the Gaeltacht	23.09.20	<p><u>Ecological Survey</u></p> <p>With regard to scoping for an EIAR for a Proposed Development, in order to assess impacts on biodiversity, fauna, flora and habitats an ecological survey should be carried out of the Proposed Development site including the route of any access roads, pipelines or cables, connections to the grid etc. to survey the habitats and species present. Any improvement or reinforcement works required for access and transport anywhere along any proposed haul route(s) should be included in the EIAR and subjected to ecological impact assessment with the inclusion of mitigation measures, as appropriate. Where bridges require strengthening this may involve grouting of crevices which may function as bat roosts. Where ex-situ impacts are possible, survey work may be required, outside of the development sites. Such surveys should be carried out by suitably qualified persons at an appropriate time of the year, depending on the species being surveyed for. The EIAR should include the results of the surveys and detail the survey methodology and timing of such surveys including consistency in terms of timed vantage point surveys. It is expected by this Department that best practice will be adhered to with regard to survey methodology and if necessary non Irish methodology adapted for the Irish situation, noting specific gaps in relation to species and age of the data outlined in</p>	<p>Ecological survey and assessment methodology is fully described in Section 6.4.</p> <p>Ornithological survey work and assessment, including proposed pre and post-construction monitoring is described in Chapter 7.</p>

	<p>some guidance documents. The EIAR should cover the whole project, including construction, operation and, if applicable, restoration or decommissioning phases. Alternatives examined should also be included in the EIAR. Inland Fisheries Ireland should be consulted with regard to fish species, if applicable. For information on Geological and Geomorphological sites, the Geological Survey of Ireland, should be consulted.</p> <p>Specific reference should be made to the National Biodiversity Action Plan. Any losses of biodiversity habitat associated with this Proposed Development (including access roads and cabling etc.) such as woodland, scrub, hedgerows and other habitats should be mitigated for. In addition, Annex 1 habitats which occur outside the Natura 2000 network are also important in terms of biodiversity conservation. The presence of any Annex I habitats outside the network should be given due consideration as part of the consideration of biodiversity matters generally for the Proposed Development. The loss of Annex 1 habitats outside SACs should be avoided wherever possible.</p> <p>In order to assess impacts it may be necessary to obtain hydrological and/or geological data. Any impact on water table levels or groundwater flows may impact on wetland sites some distance away. The EIAR should assess cumulative impacts with other plans or projects, if applicable. Where negative impacts are identified suitable mitigation measures should be detailed as appropriate.</p> <p><u>Hedgerows and related habitats</u> Hedgerows and uncultivated vegetation should be maintained where possible, as they form wildlife corridors and provide areas for birds to nest in; hedgerow trees provide a habitat for woodland flora, roosting places for bats and Badger setts may also be present. The EIAR should provide an estimate of the length/area of any hedgerow/uncultivated vegetation that will be removed. Where it is proposed that trees or hedgerows and uncultivated vegetation will be removed there should be suitable planting of native species in mitigation incorporated into the EIAR. Where possible, hedgerows, uncultivated vegetation and trees should not be removed during the nesting season (i.e. March 1st to August 31st), noting the protection afforded under the Wildlife Act 1976-2018.</p> <p><u>Watercourses and wetlands</u> Wetlands are important areas for biodiversity and ground and surface water quality should be protected during construction and operation of the Proposed Development. The EIAR should include a detailed assessment of the hydrological impacts on wetlands from the Proposed Development. Any watercourse or wetland which may be impacted on should be surveyed for the presence of protected species and species listed on Annexes II and IV of the Habitats Directive. For example, these species could include otters (<i>Lutra lutra</i>) which are protected under the Wildlife Acts and listed on Annexes II and IV of the Habitats Directive, salmon (<i>Salmo salar</i>) and Lamprey (three species in Ireland) listed on Annex II of the Habitats Directive, Freshwater Pearl Mussels (<i>Margaritifera</i> species) and White-clawed Crayfish (<i>Austropotamobius pallipes</i>) which are both protected under the Wildlife Act and listed on Annex II of the Habitats Directive, Frogs (<i>Rana temporaria</i>) and Newts (<i>Trituris vulgaris</i>) protected under the Wildlife Acts and</p>	<p>A full hydrological assessment is carried out in Chapter 9.</p> <p>Scoping requests have been made to all bodies identified.</p> <p>Assessment of impacts and measures to prevent, mitigate and compensate for potentially significant effects on ecological receptors as specified is carried out in Section 6.7.</p> <p>A full impact assessment and details of proposed mitigation measures in relation to bats, including pre and post-construction monitoring is undertaken within the Bat Report (Appendix 6-2 to this EIAR),</p> <p>Full details of how measures will be implemented during construction for the protection of watercourses and other ecological and environmental receptors is detailed in the CEMP.</p> <p>Methods to ensure that invasive species are not</p>
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	<p>Kingfishers (<i>Alcedo atthis</i>) protected under the Wildlife Acts and listed on Annex I of the Birds Directive (Council Directive 79/409 EEC).</p> <p>One of the main threats identified in the threat response plan for otter is habitat destruction. A 10m riparian buffer on both banks of a waterway is considered to comprise part of the otter habitat. Therefore any Proposed Development should be located at least 10m away from a waterway and should consider movements between waterways and waterbodies by otters.</p> <p><u>Flood Plains</u> Flood plains, if present, should be identified in the EIAR and left undeveloped to allow for the protection of these valuable habitats and provide areas for flood water retention (green infrastructure). If applicable the EIAR should take account of the guidelines for Planning Authorities entitled "<i>The Planning System and Flood Risk Management</i>" published by the Department of the Environment, Heritage and Local Government In November 2009.</p> <p><u>Bats</u> Bat roosts may be present in trees, buildings and bridges. All bat species are strictly protected under EC (Birds and Natural Habitats) Regulations, 2011 and listed on Annex IV of Habitats Directive. Bat roosts can only be disturbed and/or destroyed under licence issued under the Wildlife Act and a derogation under the EC (Birds and Natural Habitats) Regulations, 2011. An assessment of the impact of the proposed Wind Farm on bat species should be carried out noting recent guidance available, "<i>Bat and Onshore Wind Turbines: Survey, Assessment and Mitigation, 2019</i>" published jointly by Scottish Natural Heritage and Bat Conservation Trust and other stakeholders. The Department would like to highlight new survey research on patterns of bat activity in upland wind farms³ which indicates it is more appropriate to use 30 day survey periods with static automated detectors, in each season, and in different weather conditions to reduce sampling bias and to accurately determine when the curtailment mitigation is required during the operational phase. This survey should include use of detectors at different heights. Any proposed migratory bat friendly lighting should be proven to be effective and follow up to date guidance.</p> <p><u>Alien Invasive Species</u> The EIAR should also address the issue of invasive alien plant and animal species, such as Japanese Knotweed or Crayfish plague, and detail the methods required to ensure they are not accidentally introduced or spread during survey and or construction.</p> <p><u>Bird surveys</u></p>	<p>accidentally introduced or spread during construction are also provided within the CEMP.</p> <p>Assessment of potential for cumulative impacts as a result of the Proposed Development is carried out in Section 6.8.</p>
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³ <https://cieem.net/resource/cieem-webinar-patterns-of-bat-activity-at-upland-windfarms-implications-for-sampling-and-mitigation/>

		<p>Survey methodologies should follow best practice and if necessary be modified to reflect the Irish situation. Two full years of bird surveys is normally considered to be necessary. When survey results are being presented in an EIAR it is important that best practice is followed and that the full survey methodologies used, are detailed, including dates and times. Furthermore, it is expected that bird survey data should be presented in context and records should be supported by basic environmental data such as hourly estimates of visibility, glare arc's, cloud cover and precipitation during vantage point and walk over survey periods. Results for species need to be referenced back to the overall populations and their dynamics as, in some cases even a small risk to a population of a species could be considered significant. It is important that bird migration routes (day and night) are assessed as well as the flight lines (day and night) of bird species travelling between roosting and feeding areas. Limitations in guidance documentation, used in the analysis and discussion of results from any bird surveys, should be acknowledged, e.g. species that are covered by the guidance, data gaps and application to the Irish environment.</p> <p><u>Impact assessment</u></p> <p>The impact of the Proposed Development on the flora/ fauna and habitats present should be assessed with particular regard to:</p> <p>Natura 2000 sites, i.e.:</p> <ul style="list-style-type: none"> ➤ Special Areas of Conservation (SAC) designated under the EC Habitats Directive (Council Directive 92/43/EEC). ➤ Special Protection Areas (SPA) designated under the EC Birds Directive (Directive 2009/147 EC). <p>Other designated sites, or sites proposed for designation such as:</p> <ul style="list-style-type: none"> ➤ Natural Heritage Areas. ➤ Proposed Natural Heritage Areas. ➤ Nature Reserves ➤ Refuges for Fauna or Flora designated under the Wildlife Acts 1976 to 2012. ➤ Species protected under the Wildlife Acts including protected flora. <p>'Protected species and natural habitats', as defined in the Environmental Liability Directive (2004/35/EC) and European Communities (Environmental Liability) Regulations, 2008 including:</p> <ul style="list-style-type: none"> ➤ Birds Directive - Annex I species and other regularly occurring migratory species, and their habitats (wherever they occur). ➤ Habitats Directive - Annex I habitats, Annex II species and their habitats. ➤ Annex IV species and their breeding sites and resting places (wherever they occur). 	
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		<ul style="list-style-type: none"> ➤ important bird areas such as those identified by Birdlife International, features of the landscape which are of major importance for wild flora and fauna, such as those with a "stepping stone" and ecological corridors function, as referenced in Article 10 of the Habitats Directive. ➤ Other habitats of ecological value in a national to local context (such as those identified as locally important biodiversity areas within Local Biodiversity Action Plans and County Development Plans). ➤ Red data book species. ➤ Biodiversity in general. <p>Complete project details including Construction Management Plans (CMPs) need to be provided in order to allow an adequate EIAR and appropriate assessment to be undertaken. Applicants need to be able to demonstrate that CMPs and other such plans are adequate, mitigation is effective and supported by scientific information and analysis and that they are feasible within the physical constraints of the site. The positions, locations and sizes of construction infrastructure and mitigation such as settlement ponds, disposal sites and construction compounds may significantly affect European and other designated sites, habitats and species in their own right and could have an effect for example on drainage, water quality, habitat loss, and disturbance. If these are undetermined at time of the assessment all potential effects of the development on the site are not being considered.</p> <p><u>Construction Management Plans</u> Construction Management Plans should contain sufficient detail to avoid any post construction doubt with regard to the implementation of mitigation measures, timings and roles and responsibilities for same. There can be no doubts or lacunae regarding what is required for mitigation, pre-commencement surveys and or licencing requirements.</p> <p>Construction work should not be allowed to impact on water quality and measures should be detailed in the EIAR to prevent sediment and/or fuel runoff from getting into watercourses which could adversely impact on aquatic species. See EIAR; Flood Plains for details with regard to flooding risk.</p> <p>Inland Fisheries Ireland (IFI) should be consulted with regard to impacts on fish species and the applicant may find it useful to consult their publication entitled "Planning for watercourses in the urban environment" which can be downloaded from their web site.</p> <p>If applicants are not in a position to state the exact location and details of cable routes at the time of application, then they need to consider the range of options that may be used within their assessment. Should the exact height and rotor diameter of the turbines not be known at EIAR stage then the assessment of impacts must be applicable to a variety of turbine heights and rotor diameters which could be used. This should be made clear in the EIAR.</p>	
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	<p>It is important to note that unless post decision consultation with NPWS is specifically stated as a condition of planning, NPWS has no post consent role. However, regional staff are available for liaison regarding any associated licencing requirements and or new information arising for specific species of concern.</p> <p><u>Cumulative and ex situ impacts</u> A rule of thumb often used is to include all European sites within a distance of 15km. It should be noted however that this will not always be appropriate. In some instances where there are hydrological connections a whole river catchment or a groundwater aquifer may need to be included. Similarly where bird flight paths are involved the impact may be on an SPA more than 15 kilometres away.</p> <p>Other relevant Local Authorities should be consulted to determine if there are any projects or plans which, in combination with this Proposed Development, could impact on any European sites.</p> <p><u>Post construction monitoring</u> This Department recognises the importance of pre and post construction monitoring, such as recommended in Drewitt et al. (2006), and Bat Conservation Ireland (2012). The applicant should not use any proposed post construction monitoring as mitigation to supplement inadequate information in the assessment. Please refer to Circular Letter PD 2/07 and NPWS 1/07 on this issue. This can be downloaded from the Department's website https://www.npws.ie/development-consultations.</p> <p>The EIAR process should identify any pre and post construction monitoring which should be carried out. The post construction motoring should include bird and bat strikes/fatalities including the impact on any such results of the removal of carcasses by scavengers. Monitoring results should be made available to the competent authority and copied to this Department. A plan of action needs to be agreed at planning stage with the Planning Authority if the results in future show a significant mortality of birds and/or bat species. It is important to note again that unless post decision consultation with NPWS is specifically stated as a condition of planning, NPWS has no post consent role. However, regional staff are available for liaison regarding any associated licencing requirements and or new information arising for specific species of concern.</p> <p>Note: any significant change to mitigation may require amendment and where a licence has expired; there will be a need for new licence applications for protected species.</p> <p><u>Licenses</u> Where there are impacts on protected species and their habitats, resting or breeding places, licenses may be required under the Wildlife Act 1976-2018 or derogations under the EC (Birds and Natural Habitats) Regulations 2011, as amended. In particular, bats and otters are strictly protected under Annex IV of the Habitats Directive. A copy of Circular Letter NPWS 2/07 entitled “<i>Guidance on Compliance with Regulation 23 of the Habitats Regulations 1997</i> –</p>	
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		<p><i>strict protection of certain species/applications for derogation licences</i>” can be found on the Departmental web site at www.npws.ie/sites/default/files/general/circular-npws-02-07.pdf.</p> <p>It should be noted that the Regulations of 1997 have since been superseded by the European Communities (Birds and Natural Habitats) Regulations 2011, as amended. Part 6 of those Regulations is now the relevant section dealing with the protection of flora and fauna. Reference to Regulation 23 in the circular letter should be taken to mean Regulation 51 in the current Regulations.</p> <p>In addition, the EIAR should take account of species protected under sections 21, 22 and 23 of the Wildlife Acts if there are any impacts on other protected species or their resting or breeding places, such as on protected plants, badger setts or birds’ nests. And will also need to be cognisant of article 5 (d) of the Birds Directive. For that reason uncultivated vegetation, including hedges and trees, should not be removed during the nesting season (i.e. March 1st to August 31st). In order to apply for any such licenses or derogations as mentioned above the results of a survey should be submitted to the National Parks and Wildlife Service of this Department. Such surveys are to be carried out by appropriately qualified person/s at an appropriate time of the year. Details of survey methodology should be provided. Should this survey work take place well before construction commences, it is recommended that an additional ecological survey of the development site should take place immediately prior to construction to ensure no significant change in the findings of the baseline ecological survey has occurred. If there has been any significant change mitigation, this may require amendment and where a licence has expired, there will be a need for new licence applications for the protected species.</p> <p><u>Baseline data</u></p> <p>Along with the standard NPWS data requests which is recommended, other sources of habitat and species information beyond those already identified include (but are not be limited to): the National Biodiversity Data Centre (www.biodiversityireland.ie), Inland Fisheries Ireland (www.fisheriesireland.ie), BirdWatch Ireland (www.birdwatchireland.ie), Irish Raptor Study Group, Golden Eagle Trust and Bat Conservation Ireland (www.batconservationireland.org). Data may also exist at a County level within the Planning Authority. Some guidance and reference documents are provided in the Appendix to this letter.</p>	
Environmental Protection Agency	-	No response received to date	N/A
Inland Fisheries Ireland	13.04/2021	1. All watercourses that will receive drainage from the construction sites of the turbines or the access roads must be assessed in terms of aquatic biodiversity with particular emphasis on fish, the food of fish, spawning grounds and fish habitat in general. In this regard changes to river morphology should be avoided. The drainage catchments of the proposed wind farm should be clearly mapped showing the different drainage catchments of the entire area for development. Lakes and Turloughs which form part of these River systems should also be assessed.	Detailed survey, assessment of aquatic habitats and aquatic species (including electrofishing surveys

	<p>2/3. The aquatic habitat and physical nature of any watercourse, Lake or Turlough which could be affected by the development must be fully described in detail. This includes areas of open water, pool riffle glide sequences, density and types of aquatic vegetation, description of riparian zones to depth of at least 10 metres on either bank etc. The extent of the surveys should be sufficiently long enough so as to be representative of the habitat contained in that watercourse. There should be a particular focus on sections upstream and downstream of any point where an impact on the watercourse is likely to arise. It may be appropriate to survey a tributary stream and the larger, more important streams it joins, and assess the effect the discharge might further have on biodiversity and fisheries in the larger streams. Surveys of un-impacted (control) streams should also be included in the Environmental Impact Assessment.</p> <p>4. Electrofishing surveys will be required for all waters which will potentially be impacted by the project, including those which receive drainage from the site or are connect by aquifer to the site. Quantitative data in relation to all fish species should be compiled. The presence of salmonid species, crayfish and lamprey species will be of particular concern. In undertaking the electrofishing survey only experienced personnel should be employed. Appropriate permits for electrofishing must be obtained from the Department of Communications, Energy and Natural Resources. Authorised personnel must ensure that they comply with all the conditions contained in the permit.</p> <p>5. We are concerned about soils, their structure and types around all the turbines, turbine pads, associated access roads and site development. In particular we have concerns about the stability of the soils and the impact that works on both the turbines and access roads will have either directly or by vibration on the stability of the soils. The IFI will be very concerned where it is proposed to construct wind turbines on peat soils. Extra caution will be required to prevent deleterious discharges to waters.</p> <p>6. The IFI strongly recommends that specialist personnel are employed to assess soil strength and suitability of the ground at each site and along any proposed access road. This is particularly important in relation to peat soils. From our experiences we will have serious difficulties with developments on peat soils where there is excessive slope and or where the peat depth exceeds one metre. Excessive slopes will be an issue with all wind farm proposals regardless of soil type. The potential for soil movement and landslides should be assessed fully within the EIS.</p> <p>7. Particular attention should be paid to the hydrology of any site where excavations including excavations for road construction are being undertaken. It is important that natural flow paths are not interrupted or diverted in such a manner as to give rise to erosion or instability of soils caused by an alteration in water movement either above or below ground.</p> <p>8. Attention should be paid to drainage during both the construction phase and the operational phase. This includes waters being pumped from foundations or other excavations. It is particularly important during the construction phase</p>	<p>have been carried out as part of the impact assessment within this. Macro-invertebrate surveys are described in Appendix 6-3 and detailed river and fisheries surveys are provided within Appendix 6-4.</p> <p>A detailed hydrological assessment of potential impacts and bespoke mitigation is undertaken within Chapter 9 'Water and Hydrology'.</p> <p>A full assessment in relation to geology and soils is carried out in Chapter 8 'Geology and Soils'</p> <p>Details of proposed construction methodologies and monitoring to safeguard watercourses are provided within the CEMP for the Proposed Development.</p>
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	<p>that sufficient retention time in the settlement pond is available to ensure no deleterious matter is discharged to any waters. We strongly recommend that settlement ponds are maintained, where appropriate, during the operational phase to allow for the adequate settlement of suspended solids and sediments and prevent any deleterious matter from discharging into any natural waters. In constructing and designing silt traps particular attention should be paid to rainfall levels and intensity. The silt traps should be designed to minimise the movement of silt especially during intense precipitation events where the trap maybe hydraulically overloaded. It is essential that they are located with good access to facilitate monitoring sampling and maintenance. A license to discharge to waters may be required from the local authority.</p> <p>9. We have serious concerns about the construction of roads as these will tend to provide preferential flow paths for surface waters. Considerable attention to detail must be provided in relation to the interception of surface water flows. Our concerns in relation to deleterious matter have been referred to above, but we also have concerns in relation to the flow patterns and to ensuring that normal flows are maintained both during and after construction. Situations can arise where water transportation is significantly increased in certain watercourses thereby putting additional pressures on watercourses and interfering with the sustained flow of water particularly during dry weather. This should be avoided.</p> <p>10. Consideration must be given to potential for pollution of the aquifer and groundwater, lakes and turloughs as a result of the construction of this project. This should include consideration of borrow pits or other elements of the project which present a risk of pollution to the aquifer.</p> <p>11. Serious consideration must be given to the disposal of all waste materials such that they will not give rise to any risk. In terms of risk, the placing of soils on adjacent ground should not be permitted unless all the area has been the subject of an in-depth risk assessment. This is of particular concern where peat soils are encountered. Furthermore drainage from disturbed and stockpiled soils will have to be considered in advance. It may be essential to carry out soil stockpiling operations in confined areas only and to ensure vegetation of the soils with suitable plants which will promote stability. Consideration must be given to leachate from any stockpiles. The use of borrow pits presents a considerable risk to the aquatic environment in terms of the ongoing drainage of such pits and the potential for run off. The geotechnical stability of borrow pits should also be considered.</p> <p>12. Details in relation to site offices and the services necessary for the site offices should form part of the EIA. In addition details relating to operations during the construction phase to contain pollutants should also be considered. It should be noted that cement leachate, hydrocarbon oils and other toxic poisonous materials will require full containment and should not be permitted to discharge to any waters. Please note that physical pollution of watercourses in terms of dumping of unsuitable gravel material or other construction debris in or stockpiling such materials near watercourses is not acceptable as this will interfere with the aquatic habitat.</p>	
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	<p>With the above in mind for small streams in upland areas a distance of at least 15 meters should be considered as a bare minimum for a riparian zone. This should be more if the factors above are involved and will require ground truthing and site specific survey.</p> <p>We suggest that this type of development will comprise works at a number of locations but the entire development should be considered as a single building site. We strongly recommend that discussions should take place with the Environmental Section of the relevant County Council with a view to obtaining a licence to discharge trade effluent from the "building site" to waters. In this regard we consider that drainage waters particularly during the construction phase should be regarded as trade effluent. All effluent should comply with appropriate quality standards.</p> <p>The discharge of polluting or deleterious matter to any watercourse except under and in accordance with a license may be an offense under the Fisheries Acts and/or under the Water Pollution Acts. It should be noted that even if an effluent does generally comply with the quality standards contained in a license it may still cause pollution if the receiving water cannot provide sufficient assimilative capacity. With this in mind the environment impact assessment should also focus on the physical characteristics of watercourses and their ability to assimilate any pollutants discharged from the site including the discharge of water from any foundation works etc.</p> <p>Should works be approved a detailed method statement addressing the issues outlined above, including all mitigations measures, precautions and environmental incident procedures must be forwarded to Inland Fisheries Ireland before works commence.</p> <p>The above comments and observations are generic and the specific requirements will vary with each application. It should not be considered that addressing all of the above issues will influence the IFI in any decision it may make in relation to any development. Our concern is to protect the aquatic habitat, including water quality and the related riparian zone which is important in relation to the food of fish. The IFI reserves the right to request additional information in relation to the development should further points arise.</p> <p>Instream works on the salmonid watercourses will be subject to the closed season (i.e. they cannot take place from 1st October to 30th April, note this date is subject to change by legislation), to reduce the potential impact on trout populations. Any works likely to give rise to high suspended solids in close proximity to these watercourses will also be subject to the closed season.</p> <p>All works should adhere to IFT's Guidelines on protection of fisheries during construction work in and adjacent to waters.</p> <p>At all times the precautionary principle should be applied throughout for the entire development. Particular attention should be paid to the various environmental directives including the Water Framework Directive. The Fisheries Acts in</p>	
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		<p>particular and the Local Government (Water Pollution) Acts and all other environmental legislation should be considered as appropriate. As indicated in some of the points above site management and environmental plans will be important issues especially during the construction phase and we recommend that these issues should also receive consideration when preparing and EIA.</p> <p>We recommend that the above issues should be amongst the issues addressed in a comprehensive manner in the EIA.</p>	
Irish Peatland Conservation Council	-	No response received to date	N/A
Irish Red Grouse Association	-	No response received to date	N/A
Irish Raptor Study Group	-	No response received to date	N/A
Irish Wildlife Trust		No response received to date	N/A

6.4.3 Field Surveys

A comprehensive survey of the biodiversity within the EIAR Site Boundary and extended survey area was undertaken on various dates throughout 2019, 2020 and 2021 as indicated below. The following sections fully describe the ecological surveys that have been undertaken and provide details of the methodologies, dates of survey and guidance followed.

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

Multidisciplinary walkover surveys were undertaken on the 25th October, 17th December 2019, 8th & 22nd May, 22nd July, 04th September & 24th September 2020, 31st March 2021 and 29th October 2021. The majority of the survey timings fall within the recognised optimum period for vegetation surveys/habitat mapping, i.e. April to September (Smith *et al.*, 2011). A comprehensive walkover of the entire site was completed with incidental records also incorporated from other dedicated species/habitat specific surveys including otter, bats, marsh fritillary or quadrat surveys.

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

The multi-disciplinary walkover surveys comprehensively covered the lands within the EIAR Site Boundary and based on the survey findings, further detailed targeted surveys were carried out for features and locations of ecological significance. These surveys were carried out in accordance with NRA *Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna* on National Road Schemes (NRA, 2009).

During the multidisciplinary surveys, a search for Invasive Alien Species (IAS) listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015) was conducted.

Other targeted survey methodologies undertaken at the site are described in the following subsections.

6.4.3.2 Dedicated Habitat and Vegetation Composition Surveys

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

Botanical surveys of the site were also undertaken throughout multidisciplinary walkover surveys carried out in 2019, 2020 and 2021. These surveys provided an understanding of the baseline and informed further survey work following finalisation of the proposed infrastructure layout. The habitat assessment surveys described in this report have been undertaken with reference to the following guidelines and interpretation documents:

- Commission of the European Communities (2013) *Interpretation manual of European Union habitats*. Eur 27. European Commission DG Environment.
- NPWS (2019). *The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments*. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill

- Martin, J.R., O'Neill, F.H. & Daly, O.H. (2018), *The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats*. Irish Wildlife Manuals, No. 102. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.
- O'Neill, F.H., Martin, J.R., Devaney, F.M. & Perrin, P.M. (2013), *The Irish semi-natural grasslands survey 2007-2012*. Irish Wildlife Manuals, No. 78. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.
- NPWS (2018) *Conservation Objectives*. Killeglan Grassland SAC 002214. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

Plant nomenclature for vascular plants follows 'New Flora of the British Isles' (Stace, 2010), while mosses and liverworts nomenclature follows 'Mosses and Liverworts of Britain and Ireland - a field guide' (British Bryological Society, 2010).

6.4.3.2.1 Vegetation composition assessment

Detailed habitat classification and assessment was undertaken by MKO at targeted locations within the development footprint, with relevés undertaken on the 08th May 2020, 22nd May 2020, 22nd July 2020, 4th September 2020 within representative habitats at each turbine base and associated infrastructure, see Figure 6-3 and Appendix 6-1 for all quadrat data. Habitat verification surveys were carried out on the 30th March 2021 to ensure habitat composition remained the same as previous surveys. The extent of each habitat on site was mapped on site using aerial photography, hand held GPS and smartphone technology. A representative photograph was also taken for each of the habitats recorded on site, including all relevés. The location of all quadrats is shown in Figure 6-3.

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

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

The Engine for Relevés to Irish Communities Assignment (ERICA)⁴ is a web application for assigning vegetation data to communities defined by the Irish Vegetation Classification (IVC). Data can be uploaded, checked for errors and analysed and the results can then be downloaded. ERICA works with both quantitative vegetation cover data (such as are recorded in relevés and other types of botanical recording plots) and presence/absence data, such as species lists. ERICA covers grasslands, woodland, duneland, heaths, bogs, fens, mires, freshwater, saline waters, rocky habitats, scrub, strandline, saltmarsh and weed communities (Perrin, 2019).

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

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

⁴ Perrin, 2019, ERICA – Engine for Relevés to Irish Communities Assignment V5.0 User's Manual, Online, Available at: https://biodiversityireland.shinyapps.io/vegetation-classification/w_9cd4889a/manual.pdf, Accessed: 10.10.2020

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

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

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



- ### Map Legend
- EIAR Site Boundary
 - Quadrat Locations
 - Proposed Turbine Locations
 - Proposed Access Roads
 - Proposed Substation Location
 - Proposed Spoil Storage Areas
 - Infrastructure Spoil Storage Areas
 - Proposed Met Mast Location
 - Proposed Construction Compound

Microsoft product screen shots reprinted with permission from Microsoft Corporation



Botanical Quadrat Locations	
Project Title Seven Hills Wind Farm, Co. Roscommon	
Drawn By PE	Checked By JH
Project No. 190907	Figure No. 6-3
Scale 1:25000	Date 2022-06-01

MKO
 Planning and Environmental Consultants

Turn Road, Galway
 Ireland, H91 VW84
 +353 (0)91 733611
 email: fo@mkoreland.ie
 Website: www.mkoreland.ie

6.4.3.3 Terrestrial Fauna Surveys

The results of the desk study, scoping replies, incidental records of protected species during ecological survey work and multidisciplinary walkover surveys were used to inform the scope of targeted ecological surveys required. Dedicated surveys for bats, otter and badger were undertaken at the times set out below with the methodologies followed also provided below. During the multidisciplinary walkover surveys, which included the Grid Connection route, records of invertebrates including butterflies, damselflies, dragonflies, moths, beetles etc. were recorded. Given the known occurrence of the marsh fritillary butterfly in the area, this species was also focused on during the site visits with dedicated surveys undertaken in 04th September .2020 and 24th September .2020, as well as follow-up spring surveys on 31st March 2021, to determine the occurrence, distribution and likely size of the population within the survey area.

6.4.3.3.1 Badger Survey

Areas identified as providing potential habitat for badger were subject to specialist targeted survey. Dedicated badger surveys were conducted on the 25th October, 17th December 2019, 8th & 22nd May, 22nd July, 04th September & 24th September 2020 and 30th March 2021. The badger surveys covered the entire EIAR Site Boundary and surrounding suitable habitats in the survey area. Targeted surveys were also undertaken in areas where incidental badger signs, setts or sightings were recorded during walkover bird surveys of the site. The badger survey was not constrained by vegetation given the nature of the habitats within the site and the timing of the surveys (NRA 2006a).

The badger surveys were conducted in order to determine the presence or absence of badger signs within and outside (areas of identified suitable habitat) the site of the Proposed Development and wider survey area. This involved a search for all potential badger signs as per NRA (2009) (latrines, badger paths and setts). If encountered, setts would be classified as per the convention set out in NRA (2009) (i.e. main, annexe, subsidiary, outlier). Where setts were identified, these were monitored using remote motion-sensitive cameras to establish usage by badgers and levels of activity.

The badger survey was conducted adhering to best practice guidance (NRA, 2009) and followed the 'Guidelines for the Treatment of Badger Prior to the Construction of National Roads Schemes' (NRA, 2006a) and CIEEM best practice competencies for species surveys (CIEEM, 2013⁵).

6.4.3.3.2 Otter Survey

Although there are no watercourses within the Proposed Development site, or in close proximity to the proposed Wind Farm infrastructure, the Grid Connection route will require the crossing of watercourses at 5 existing crossing locations. These were identified as providing potential habitat for otter and were subject to specialist targeted survey on the 24th September 2020, 30th March 2021 and during dedicated aquatic site surveys carried out during September 2021.

The otter survey was conducted as per TII (2009) guidelines (Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes). This involved a search for all otter signs e.g. spraints, scat, prints, slides, trails, couches and holts. In addition to the width of the rivers/watercourses, a 10m riparian buffer (both banks) was considered to comprise part of the otter habitat (NPWS 2009). The dedicated otter survey also followed the guidance as set out in NRA (2008) 'Guidelines for the Treatment of Otters Prior to the Construction of National Roads Schemes' and following CIEEM best practice competencies for species surveys (CIEEM, 2013⁶).

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

⁶ CIEEM, 2013, Technical Guidance Series – Competencies for Species Survey, Online, Available at: <https://cieem.net/resource/competencies-for-species-survey-css/> Accessed: 20.03.2021

6.4.3.3.3 Marsh Fritillary Surveys

Following the identification of suitable habitat for marsh fritillary within the site during habitat surveys, as well as the results of the desk study, targeted surveys for the species were undertaken for adults on the 8th and 22nd May as well as targeted larval web surveys on the 4th & 24th September 2020 and 30th March 2021. The survey methodology followed that described in the NRA (2009) best practice guidance document. This involved walked surveys to identify suitable areas of marsh fritillary habitat within or adjacent to the development footprint (the zone of influence). This was achieved by walking transects through areas of potentially suitable habitat. Where suitable habitat did occur, detailed surveys to locate larval webs were undertaken. Areas of suitable habitat were also mapped as part of the survey effort and informed the layout of the Proposed Development. In addition, habitat suitability assessments were undertaken within areas of suitable habitat for the species following those developed by the NBDC⁷. This involved an assessment of the vegetation characteristics at a requisite number of stops within the area of suitable habitat. Records of vegetation height, abundance of devil's bit scabious, presence of structured vegetation, low invading scrub and stock grazing were noted within the relevant recording sheets.

6.4.3.3.4 Bat Surveys

Detailed description of the survey methodologies undertaken at the site during the survey period April 2020 and September 2020 are provided within the full Bat Report included as Appendix 6-2 of this EIAR, together with full details of the survey times and the surveyors who carried out the bat survey and assessment work.

Survey design and effort in 2020 was created in accordance with the best practice guidelines available at the time, 'Bat Surveys: Good Practice Guidelines' prepared by the Bat Conservation Trust (Hundt, 2012). Surveys undertaken were undertaken in strict accordance with those prescribed in SNH (2019) 'Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation'. This is in line with standard best practice industry guidelines.

Surveys of the site carried out during 2021 ascertained that the habitats of the site remained consistent with those recorded and assessed in 2020.

6.4.3.3.5 Aquatic surveys

Kick Sampling (MKO)

Kick sampling was carried at 4 locations at watercourses along the proposed Grid Connection route in order to inform baseline conditions. No watercourses occur within the likely zone of impact from the proposed turbine infrastructure due to the karst nature of the bedrock. These were carried out on the 30th March 2021. The locations of each watercourse surveyed are provided in Figure 6-4.

Biological water quality was assessed through kick-sampling each of these watercourses. Macro-invertebrate samples were converted to Q-ratings as per Toner et al. (2005)⁸. The applied Q ratings followed the EPA water quality classes and Water Framework Directive status categories. All riverine samples were taken with a standard kick sampling hand net (250mm width, 500µm mesh size) from areas of riffle/glide utilising a two-minute sample, as per ISO standards for water quality sampling (ISO

⁷ NBDC, 2019, *Habitat Condition Assessment for Marsh Fritillary*, Online, Available at: <http://www.biodiversityireland.ie/wordpress/wp-content/uploads/Marsh-Fritillary-Habitat-Condition-Form.pdf>, Accessed, 20 March 2020

⁸ Toner, P., Bowman, J., Clabby, K., Lucey, J., McGarrigle, M., Concannon, C., & MacGarthaigh, M. (2005). *Water quality in Ireland*. Environmental Protection Agency, Co. Wexford, Ireland.

10870:2012). Large cobble was also washed at each site where present. The results of the surveys are provided in Appendix 6-3.

Dedicated Aquatic Surveys

Dedicated aquatic surveys were undertaken during September 2021 on a catchment-wide scale by Triturus Environmental Ltd. on behalf of MKO. The baseline surveys focused on aquatic habitats in relation to fisheries potential (including both salmonid and lamprey habitat), white-clawed crayfish (*Austropotamobius pallipes*), macrophytes and aquatic bryophytes, aquatic invasive species, and fish of conservation value which may use the watercourses in the vicinity of the proposed project. The detailed Aquatic Baseline Report is provided as Appendix 6-4 and provides the full methodology for the surveys.

Aquatic survey sites covered during the surveys were located on the Ballyglass River (EPA code: 26B15), Ratawragh Stream (26R39), Barr's Drain (26B34) and the Cross River (26C10) and an unnamed drainage channel tributary (see Table 2-1 and Figure 2-1 within Appendix 6-4 for further details of the locations).

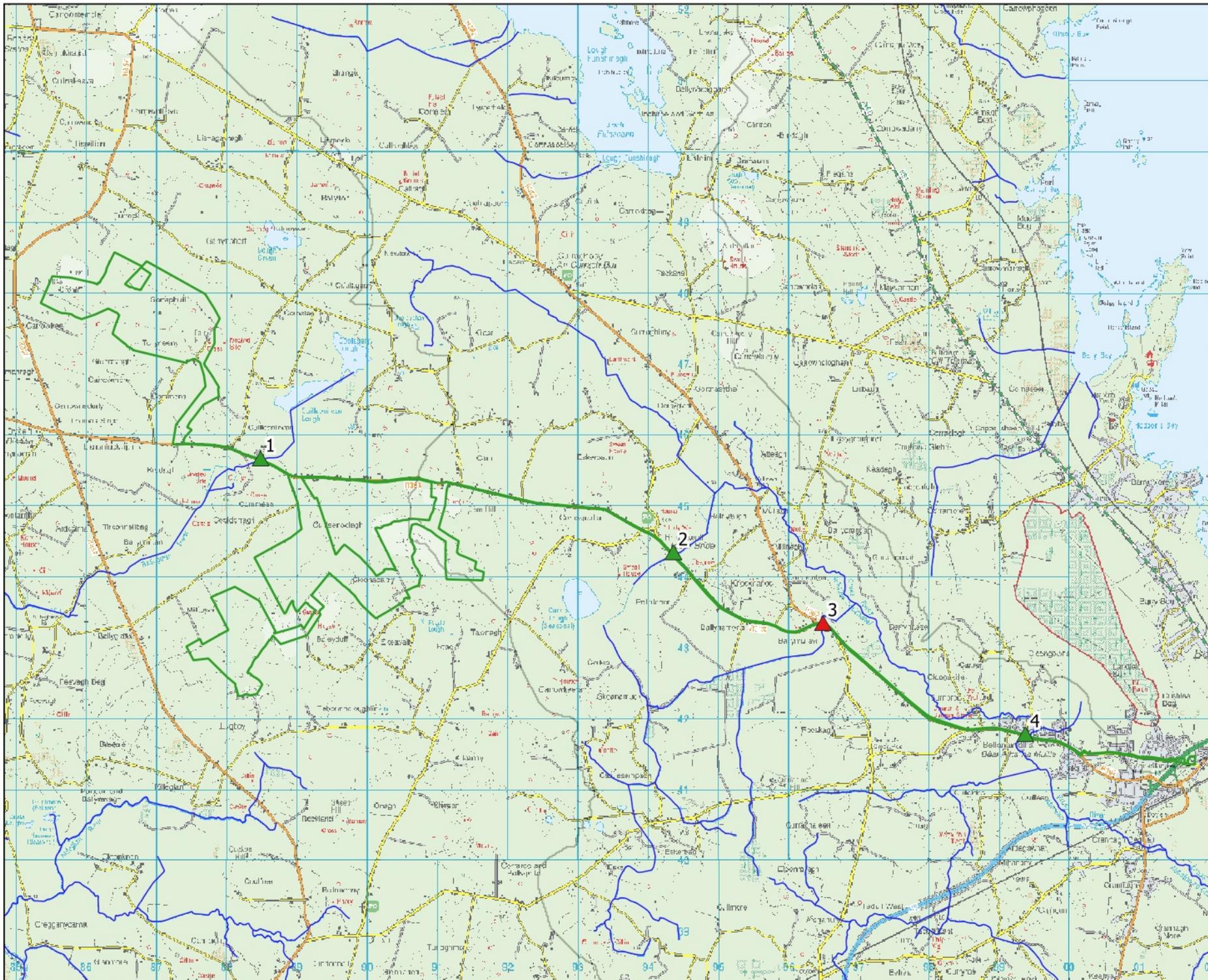
6.4.3.3.6 **Invasive species survey**

During the multi-disciplinary walkover surveys, a search for non-native invasive species was undertaken. The survey focused on the identification of invasive species listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (As Amended).

6.4.3.3.7 **Survey limitations**

Seasonal factors that affect distribution patterns and habits of species were taken into account when conducting the surveys. The potential of the site to support faunal populations of conservation importance whose presence on site may vary due to seasonal absence or nocturnal/cryptic habits was considered, and surveys were designed to provide a comprehensive temporal and seasonal spread.

The specialist studies, analysis and reporting have been undertaken in accordance with the appropriate guidelines. The habitats and species on the site were readily identifiable and robust assessments were made during the field visit. No limitations in the scope, scale or context of the assessment have been identified.



Map Legend

Kick Sampling Stations (30.03.2021):

- ▲ Sampled
- ▲ Not sampled (unsafe)
- River Waterbodies (Water Framework Directive)
- EIAR Site Boundary



Macroinvertebrate Sample Station Locations

Seven Hills Wind Farm, Co Roscommon

Drawn By	Checked By
PE	JH
Project No. 190907	Figure No. 6-4
Scale 1:70000	Date 18.05.2022

MKO Planning and Environmental Consultants
 Turn Road, Galway
 Ireland, H91 VV84
 +353 (0)91 735611
 email: info@mkoland.ie
 Website: www.mkoland.ie

6.4.4 Methodology for Assessment of Impacts and Effects

6.4.4.1 Identification of Target Receptors and Key Ecological Receptors

The methodology for assessment followed a precautionary screening approach with regard to the identification of Key Ecological Receptors (KERs). Following a comprehensive desk study, initial site visits (main ecological surveys of the site undertaken 25th May, 16th June, 7th and 25th July, 14th August, 25th & 26th September, 6th and 23rd October 2017, 8th October 2018, 30th, 31st July 2020 and 30th March 2021 not including bat surveys) and stakeholder consultation; “Target receptors” likely to occur in the zone of influence of the development were identified. The target receptors included habitats and species that were protected under the following legislation:

- Annexes of the EU Habitats Directive.
- Qualifying Interests (QI) of Special Areas of Conservation (SAC) within the likely zone of impact.
- Species protected under the Wildlife Acts 1976-2021.
- Species protected under the Flora Protection Order 2015.

Relating to the strict protection of Annex IV animal species, the site was judged to be potentially suitable for otter and bats see Sections 6.5 and 6.6. Further detailed survey effort for these species was carried out as required⁹ and where potential of significant effects on these species was identified they have been classified as Key Ecological Receptors (see below) for the purposes of impact assessment.

6.4.4.2 Determining Importance of Ecological Receptors

The importance of the ecological features identified within the survey area was determined with reference to a defined geographical context. This was undertaken following a methodology that is set out in Chapter 3 of the ‘Guidelines for Assessment of Ecological Impacts of National Roads Schemes’ (NRA, 2009). These guidelines set out the context for the determination of value on a geographic basis with a hierarchy assigned in relation to the importance of any particular receptor. The guidelines provide a basis for determination of whether any particular receptor is of importance on the following scales:

- International
- National
- County
- Local Importance (Higher Value)
- Local Importance (Lower Value)

The Guidelines clearly set out the criteria by which each geographic level of importance can be assigned. Locally Important (lower value) receptors contain habitats and species that are widespread and of low ecological significance and of any importance only in the local area. Internationally Important sites are either designated for conservation as part of the Natura 2000 Network (SAC or SPA) or provide the best examples of habitats or internationally important populations of protected flora and fauna. Specific criteria for assigning each of the other levels of importance are set out in the guidelines and have been followed in this assessment. Where appropriate, the geographic frame of reference set out above was adapted to suit local circumstances. In addition, and where appropriate, the conservation status of habitats and species is considered when determining the significance of ecological receptors.

⁹ Guidance for Public authorities on the Application of Articles 12 and 16 of the EU Habitats Directive to development/works undertaken by or on behalf of a Public authority. NPWS 2021.

Any ecological receptors that are determined to be of National or International, County or Local importance (Higher Value) following the criteria set out in NRA (2009) are considered to be Key Ecological Receptors (KERs) for the purposes of ecological impact assessment if there is a pathway for effects thereon. Any receptors that are determined to be of Local Importance (Lower Value) are not considered to be Key Ecological Receptors.

6.4.4.3 Characterisation of Impacts and Effects

The Proposed Development will result in a number of impacts. The ecological effects of these impacts are characterised as per the CIEEM 'Guidelines for Ecological Impact Assessment in the UK and Ireland' (2018). These guidelines are the industry standard for the completion of Ecological Impact Assessment in the UK and Ireland. This chapter has also been prepared in accordance with the corresponding EPA guidance (EPA 2022). The headings under which the impacts are characterised follow those listed in the guidance document and are applied where relevant. A summary of the impact characteristics considered in the assessment is provided below:

- **Positive or Negative.** Assessment of whether the Proposed Development results in a positive or negative effect on the ecological receptor.
- **Extent.** Description of the spatial area over which the effect has the potential to occur.
- **Magnitude** Refers to size, amount, intensity and volume. It should be quantified if possible and expressed in absolute or relative terms e.g. the amount of habitat lost, percentage change to habitat area, percentage decline in a species population.
- **Duration** is defined in relation to ecological characteristics (such as the lifecycle of a species) as well as human timeframes. For example, five years, which might seem short-term in the human context or that of other long-lived species, would span at least five generations of some invertebrate species.
- **Frequency and Timing.** This relates to the number of times that an impact occurs and its frequency. A small-scale impact can have a significant effect if it is repeated on numerous occasions over a long period.
- **Reversibility.** This is a consideration of whether an effect is reversible within a 'reasonable' timescale. What is considered to be a reasonable timescale can vary between receptors and is justified where appropriate in the impact assessment section of this report.

6.4.4.4 Determining the Significance of Effects

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

For the purpose of Ecological Impact Assessment (EcIA), 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general. Conservation objectives may be specific (e.g. for a designated site) or broad (e.g. national/local nature conservation policy) or more wide-ranging (enhancement of biodiversity). Effects can be considered significant at a wide range of scales from international to local (CIEEM, 2018).

When determining significance, consideration is given to whether:

- Any processes or key characteristics of key ecological receptors will be removed or changed.
- There will be an effect on the nature, extent, structure and function of important ecological features.

- There is an effect on the average population size and viability of ecologically important species.
- There is an effect on the conservation status of important ecological habitats and species.

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

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

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

As per TII (NRA, 2009) and CIEEM (2018) best practice guidelines, the following key elements should also be examined when determining the significance of effects:

- The likely effects on ‘integrity’ should be used as a measure to determine whether an impact on a site is likely to be significant (NRA, 2009).
- A ‘significant effect’ is an effect that either supports or undermines biodiversity conservation objectives (CIEEM, 2018).

Integrity

In the context of EcIA, ‘integrity’ refers to the coherence of the ecological structure and function, across the entirety of a site, that enables it to sustain all of the ecological resources for which it has been valued (NRA, 2009). Impacts resulting in adverse changes to the nature, extent, structure and function of component habitats and effects on the average population size and viability of component species, would affect the integrity of a site, if it changes the condition of the ecosystem to unfavourable.

Conservation status

An impact on the conservation status of a habitat or species is considered to be significant if it will result in a change in conservation status. According to CIEEM (2018) guidelines the definition for conservation status in relation to habitats and species are as follows:

- Habitats – conservation status is determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions as well as its distribution and its typical species within a given geographical area
- Species – conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area.

As defined in the EU Habitats Directive 92/43/EEC, the conservation of a habitat is favourable when:

- Its natural range, and areas it covers within that range, are stable or increasing
- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future
- The conservation status of its typical species is favourable.

The conservation of a species is favourable when:

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats
- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future
- There is and will probably continue to be, a sufficiently large habitat to maintain its population on a long-term basis.

According to the NRA/CIEEM methodology, if it is determined that the integrity and/or conservation status of an ecological feature will be impacted on, then the level of significance of that impact is related to the geographical scale at which the impact will occur (i.e. local, county, national, international).

6.4.4.5 Incorporation of Mitigation

Section 6.7 of this EIAR assesses the potential effects of the Proposed Development to ensure that all effects on sensitive ecological receptors are adequately addressed. Where significant effects on sensitive ecological receptors are predicted, mitigation has been incorporated into the project design or layout to address such impacts. The implemented of mitigation measures seeks to avoid or where avoidance is not possible to reduce or offset potentially significant residual effects, post mitigation. The mitigation measures proposed are judged to be appropriate and adequate to remove the potential for significant effects on ecological receptors assuming their full implementation.

6.5 Establishing the Ecological Baseline

6.5.1 Desk Study

The following sections describe the results of a survey of published material that was consulted as part of the desk study for the purposes of the ecological assessment. It provides a baseline of the ecology known to occur in the existing environment. Material reviewed includes the Site Synopses for designated sites within the zone of influence, as compiled by the National Parks and Wildlife Service (NPWS) of the Department of Culture, Heritage and the Gaeltacht, bird and plant distribution atlases and other research publications (see Bibliography).

6.5.1.1 Designated Sites

6.5.1.1.1 Identification of the Designated Sites within the Likely Zone of Influence of the Proposed Development

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

Special Areas of Conservation (SACs) and Special Protection Areas for Birds (SPAs) are designated under the EU Habitats Directive and EU Birds Directive, respectively and are collectively known as 'European Sites'.

Natural Heritage Areas (NHAs) are designated under Section 18 the Wildlife (Amendment) Act 2000 and their management and protection is provided for by this legislation and planning policy. The potential for effects on these designated sites is fully considered in this EcIA.

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

Nationally designated sites that are also designated as European Sites have been assessed as those designations within the Appropriate Assessment Screening Report and NIS, with the relevant conclusions are recorded and referenced in this chapter.

In relation to European sites, separate documentation has been prepared to provide the competent authorities with the information necessary to complete an Appropriate Assessment screening and an Appropriate Assessment for the Proposed Development in compliance with Article 6(3) of the Habitats Directive. The potential for significant effects on European Sites and adverse impacts on the integrity of European Sites is fully assessed within the AA Screening Report (AASR) and Natura Impact Statement (NIS), respectively, that accompanies this application.

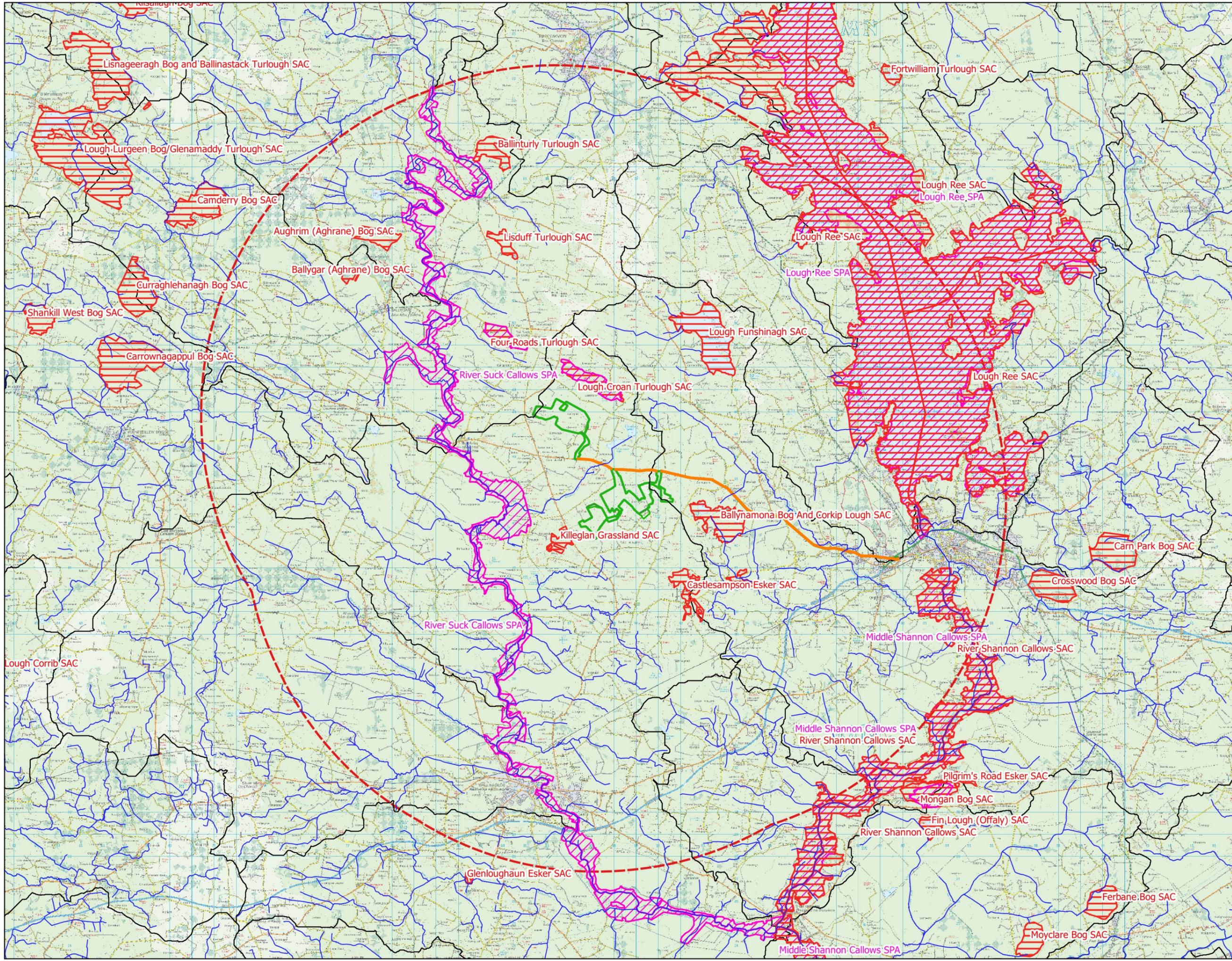
As per the aforementioned EPA Guidance (2022), *"a biodiversity section of an EIAR, should not repeat the detailed assessment of potential effects on European sites contained in a Natura Impact Statement"* but should *"incorporate their key findings as available and appropriate"*. This section provides a summary of the key assessment findings with regard to Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). Section 6.7.2 of this EIAR provides a summary of the key assessment findings with regard to European Designated Sites.

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

- Initially the most up to date GIS spatial datasets for European and Nationally designated sites and water catchments were downloaded from the NPWS website (www.npws.ie) and the EPA website (www.epa.ie) on the 17/05/2022. The datasets were utilised to identify Designated Sites which could feasibly be affected by the Proposed Development.
- Potential for connectivity with European or Nationally designated sites from the Proposed Development was considered in this initial assessment. No potential connectivity with any sites over 15km from the Proposed Development was identified, and this distance was judged to be an appropriate distance for further assessment of potential pathways for effect.
- A map of all the European Sites within 15km is provided in Figure 6-5 with all Nationally designated sites shown in Figure 6-6.
- Table 6-4 provides details of all relevant designated sites as identified in the preceding steps and assesses which are within the likely Zone of Impact. All European Designated Sites are fully described and assessed in light of their specific conservation objectives within the Screening for Appropriate Assessment and Natura Impact Statement reports submitted as part of this planning application.
- The designation features of these sites, as per the NPWS website (www.npws.ie), were consulted and reviewed at the time of preparing this report 17/05/2022.



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



Map Legend

- EIAR Boundary
- Grid Connection Route
- Identified ZoI from Wind Farm Site
- River Waterbodies (WFD)
- Hydrological Subcatchments (WFD)
- EU Designated Sites**
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)

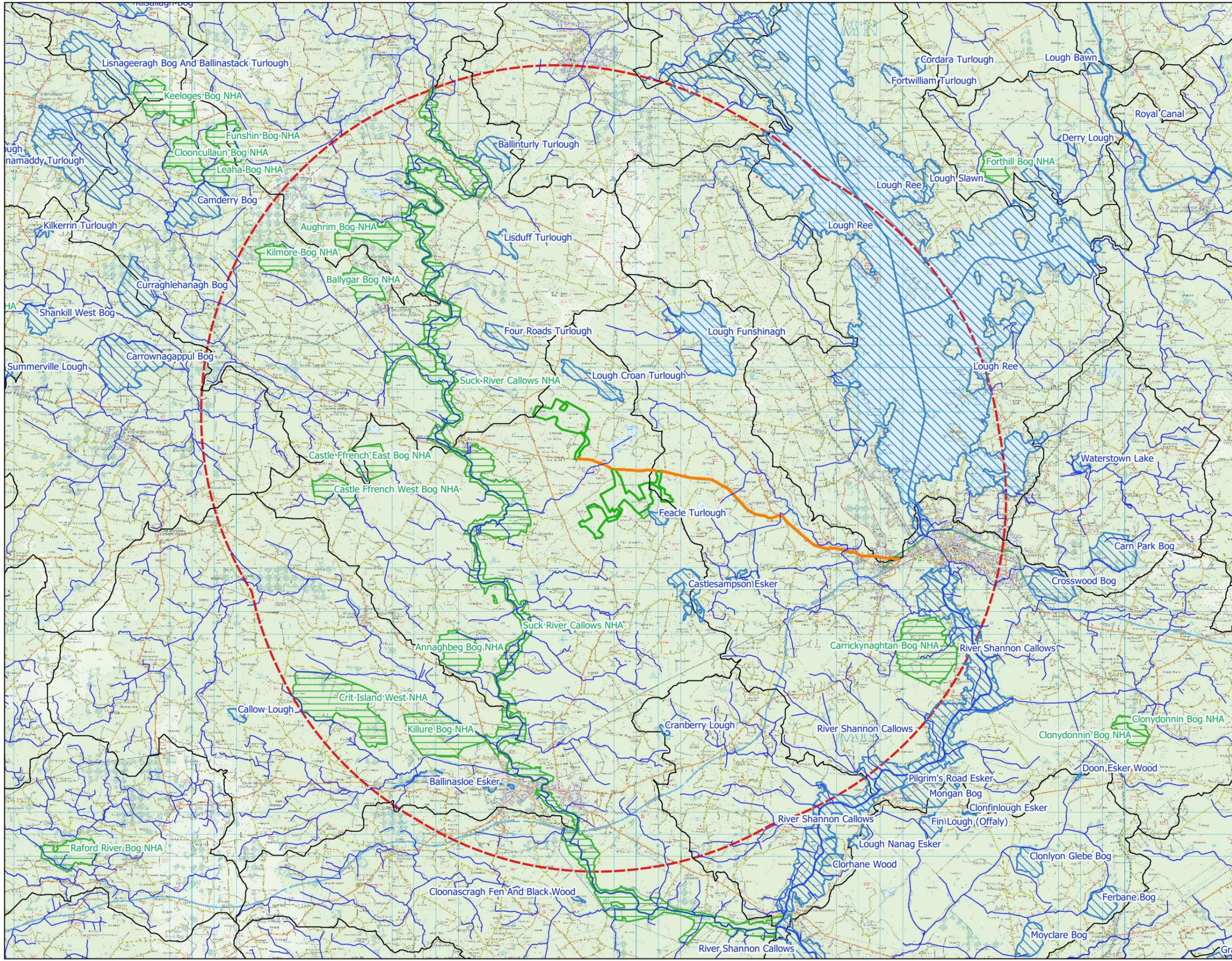
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European Sites within the Zone of Influence

Project Title Seven Hills Wind Farm, Co. Roscommon	
Drawn By PE	Checked By JH
Project No. 190907	Figure No. 6-5
Scale 1:150000	Date 2022-06-01

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



- ### Map Legend
- EIAR Boundary
 - Grid Connection Route
 - Identified ZoI from Wind Farm Site
 - River
 - Waterbodies (WFD)
 - Hydrological Subcatchments (WFD)
- ### Nationally Designated Sites
- Natural Heritage Area (NHA)
 - Proposed Natural Heritage Area (pNHA)

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Nationally Designated Sites within the Zone of Influence	
Project Title Seven Hills Wind Farm, Co. Roscommon	
Drawn By PE	Checked By JH
Project No. 190907	Figure No. 6-6
Scale 1:150000	Date 2022-06-01

MKO
Planning and Environmental Consultants

Team Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@mkofireland.ie
Website: www.mkofireland.ie

Table 6-4: Identification of European Sites (SACs and SPAs) and Nationally designated sites (NHAs and pNHAs) within the Likely Zone of Impact

Designated Site	Distance from Proposed Development / Grid Connection route (km)	Likely Zone of Impact Determination
Special Area of Conservation		
Ballynamona Bog And Corkip Lough SAC [002339]	0.4km East / 0.18km South	<p>No surface water drainage features have been identified within the Proposed Development site. The SAC is designated for turlough habitat and so potential for impacts via groundwater-based pathways have been assessed. Potential pathway for effect has been identified between the Proposed Development and the SAC though potential deterioration in water quality via groundwater contamination.</p> <p>The SAC is not designated for any faunal species and so consequently there is no potential for disturbance related effects resulting from the close proximity of the development site.</p> <p>Potential impacts are fully assessed in the accompanying Natura Impact Statement (NIS) report.</p>
Killeglan Grassland SAC (002214)	0.4 km West / 5km South-west	<p>There will be no direct impacts on the terrestrial habitats for which this SAC is designated as the Proposed Development site is located entirely outside of the SAC.</p> <p>Given the close proximity to the site of the Proposed Development the potential for deterioration of QI grassland habitat resulting from project emissions during the construction, operation and decommission phases, has been identified on a precautionary basis. The potential for impact, via the identified pathway, cannot be excluded in the absence of mitigation.</p> <p>Potential impacts are fully assessed in the accompanying Natura Impact Statement (NIS) report.</p>
Lough Croan Turlough SAC (000610)	0.8km North / 3.6km North-west	<p>There will be no direct impacts on these SAC's as they occur outside of the Proposed Development site boundary.</p> <p>No surface water drainage features have been identified within the Proposed Development site. The SAC is designated for turlough habitat, and so potential for impacts via groundwater-based pathways have also been considered in the AASR and NIS. The detailed hydrological assessment (see Section</p>

Designated Site	Distance from Proposed Development / Grid Connection route (km)	Likely Zone of Impact Determination
		<p>9.4.2.9, Chapter 9 of the accompanying EIAR) has concluded that Lough Croan Turlough is not hydraulically connected to groundwater flows below the proposed Northern Cluster of the Proposed Development site. Therefore no potential pathway for effect via groundwater pathways exists between the Proposed Development and the SAC.</p> <p>The SAC is therefore <i>not</i> within the Likely Zone of Impact.</p>
Castlesampson Esker SAC (001625)	1.7km, South / 2.5km, South	<p>There will be no direct impacts on this SAC as it occurs outside of the Proposed Development site boundary.</p> <p>No surface water drainage features have been identified within the Proposed Development site. Detailed hydrological assessments carried out at the site (see Section 9.4.2.9, Chapter 9 ‘Water and Hydrology’ of the EIAR) have concluded that regional groundwater flow from the Proposed Development site is not in the direction of the Castlesampson Esker SAC. No potential for impacts due to a deterioration in water quality via groundwater pathways on the aquatic receptors of this SAC therefore exists.</p> <p>The SAC is therefore not within the Likely Zone of Impact.</p>
Four Roads Turlough SAC (001637) (also designated as a pNHA)	2.3km, North / 8.2km, North-west	<p>There will be no direct impacts on these SAC’s as they occur outside of the Proposed Development site boundary.</p> <p>No surface water drainage features have been identified within the Proposed Development site. The possibility of groundwater reaching Four Roads Turlough cannot be discounted, given that given that 2 no. watercourses emerge between Four Roads turlough and the Northern Cluster of the Proposed Development (see Section 9.4.2.9, Chapter 9 ‘Water and Hydrology of the EIAR).</p> <p>Potential impacts are fully assessed in the accompanying Natura Impact Statement (NIS) report.</p>
Lough Funshinagh SAC [000611] (also nationally designated as a pNHA)	4.4km North-east / 4.7km, North	<p>There will be no direct impacts on these SACS as they occur outside of the Proposed Development site boundary.</p> <p>No surface water drainage features have been identified within the Proposed Development</p>

Designated Site	Distance from Proposed Development / Grid Connection route (km)	Likely Zone of Impact Determination
		<p>site. The detailed hydrological assessment (see Section 9.4.2.9, Chapter 9 of the accompanying EIAR) has concluded that there is no hydraulic connection between the Wind Farm site and Lough Funshinagh. As such, none of the impact pathways can occur at Lough Funshinagh SAC/pNHA in respect of the Proposed Development.</p> <p>The SAC is therefore not within the Likely Zone of Impact.</p>
Lisduff Turlough SAC [000609]	6.4km North / 11.5km, North-west	<p>There will be no direct impacts on these SAC's as they occur outside of the Proposed Development site boundary.</p> <p>The detailed hydrological assessment (see Section 9.4.2.9, Chapter 9 of the accompanying EIAR) has concluded that, due to an area of high ground wrapping around the southern and eastern flanks of the Lisduff turlough SAC acting as a hydraulic boundary, there is no potential for indirect effects resulting from a deterioration in water quality via groundwater pathways on this SAC. No groundwater connectivity has been identified between the site of the Proposed Development or the Grid Connection route and this SAC.</p> <p>The SACs are therefore not within the Likely Zone of Impact.</p>
Lough Ree SAC [000440]	8.0km East / 1.5km North-east	<p>There will be no direct impacts on these SAC's as they occur outside of the Proposed Development site boundary.</p>
Aughrim (Aghrane) Bog SAC [002200]	9.2km North-west / 15.7km North-west	<p>The potential for indirect effects resulting from a deterioration in water quality via groundwater pathways has been assessed in the AASR. The detailed hydrological assessment (see Section 9.4.2.9, Chapter 9 of the accompanying EIAR) has concluded that no groundwater connectivity exists between the site of the Proposed Development and these SACs, and therefore there is no pathway for effects on these SACs via deterioration in water quality.</p>
Ballygar (Aghrane) Bog SAC [002199]	9.3km North-west / 14.6km North-west	<p>The potential for indirect effects resulting from a deterioration in water quality via groundwater pathways has been assessed in the AASR. The detailed hydrological assessment (see Section 9.4.2.9, Chapter 9 of the accompanying EIAR) has concluded that no groundwater connectivity exists between the site of the Proposed Development and these SACs, and therefore there is no pathway for effects on these SACs via deterioration in water quality.</p>
Ballinturly Turlough SAC [000588]	10.4km North-west / 15.3km North-west	<p>The potential for indirect effects resulting from a deterioration in water quality via groundwater pathways has been assessed in the AASR. The detailed hydrological assessment (see Section 9.4.2.9, Chapter 9 of the accompanying EIAR) has concluded that no groundwater connectivity exists between the site of the Proposed Development and these SACs, and therefore there is no pathway for effects on these SACs via deterioration in water quality.</p> <p>These SACs are therefore not within the Likely Zone of Impact.</p>
River Shannon Callows SAC [000216]	11.1km East (nearest section) / 1.3km South-east NB. Grid Connection route crosses the Cross River	<p>There will be no direct effects on this SAC as it is outside of the Proposed Development site boundary.</p>

Designated Site	Distance from Proposed Development / Grid Connection route (km)	Likely Zone of Impact Determination
		<p>The proposed Grid Connection route crosses the Cross River at an existing crossing, which in turn flows into the SAC, and therefore potential indirect effects exists in relation to deterioration in water quality.</p> <p>Potential impacts are fully assessed in the accompanying Natura Impact Statement (NIS) report.</p>
Special Protection Areas (SPA)		
Lough Croan Turlough SPA (004139)	0.8km North/ 3.7km North	<p>Potential direct impacts on SPA species relating to ex-situ habitat loss, displacement and collision mortality are fully assessed in the accompanying AA Screening and Natura Impact Statement (NIS) reports.</p> <p>The detailed hydrological assessment (see Section 9.4.2.9, Chapter 9 of the this EIAR) has concluded that Lough Croan is not hydraulically connected to groundwater flows below the proposed Norther Cluster of the Wind Farm site. Therefore, no potential pathway for effect via groundwater pathways exists between the Proposed Development and the SAC.</p> <p>This SPA is <i>within</i> the Likely Zone of Impact. Potential for adverse impacts has been fully assessed in the accompanying Natura Impact Statement (NIS) report.</p>
River Suck Callows SPA [004097]	2.0km, West / 6.3km	<p>Potential direct impacts on SPA species relating to ex-situ habitat loss, displacement and collision mortality are fully assessed in the accompanying AA Screening and Natura Impact Statement (NIS) reports.</p> <p>The Grid Connection route of the Proposed Development crosses the Ballyglass River, which in turn flows into the SAC, and therefore potential indirect effects exists in relation to deterioration in water quality.</p> <p>This SPA is <i>within</i> the Likely Zone of Impact. Potential for adverse impacts has been fully assessed in the accompanying Natura Impact Statement (NIS) report.</p>
Four Roads Turlough SPA (004140)	2.3km / 8.2km	<p>Potential direct impacts on SPA species relating to ex-situ habitat loss, displacement and collision mortality are fully assessed in the accompanying AA Screening and Natura Impact Statement (NIS) reports.</p>

Designated Site	Distance from Proposed Development / Grid Connection route (km)	Likely Zone of Impact Determination
		<p>No surface water drainage features have been identified within the Proposed Development site. The possibility of groundwater reaching Four Roads Turlough cannot be discounted given that given that 2 no. watercourses emerge between Four Roads turlough and the Northern Cluster of the Proposed Development (see Section 9.4.2.9, Chapter 9 'Water and Hydrology of the EIAR).</p> <p>This SPA is <i>within</i> the Likely Zone of Impact. Potential for adverse impacts has been fully assessed in the accompanying Natura Impact Statement (NIS) report.</p>
Lough Ree SPA [004064]	8.1km, East / 1.6km East	<p>Potential direct impacts on SPA species relating to ex-situ habitat loss, displacement and collision mortality are fully assessed in the accompanying AA Screening and Natura Impact Statement (NIS) reports.</p> <p>Due to the lack of aquatic features within the site of the Proposed Development and the lack of hydrological connectivity, no pathway for significant indirect effects on water quality of supporting wetland habitat exists.</p> <p>This SPA is <i>within</i> the Likely Zone of Impact. Potential for adverse impacts has been fully assessed in the accompanying Natura Impact Statement (NIS) report.</p>
Middle Shannon Callows SPA [004096]	11.1km, East / 7.3km East	<p>Potential direct impacts on SPA species relating to ex-situ habitat loss, displacement and collision mortality are fully assessed in the accompanying AA Screening and Natura Impact Statement (NIS) reports.</p> <p>The Grid Connection route of the Proposed Development crosses the Cross River, which in turn flows into the SAC, and therefore the potential for indirect effects in relation to deterioration in water quality of supporting wetland habitat has been screened in for further assessment.</p> <p>This SPA is <i>within</i> the Likely Zone of Impact. Potential for adverse impacts has been fully assessed in the accompanying Natura Impact Statement (NIS) report.</p>
Natural Heritage Areas (NHA)		
Suck River Callows NHA [000222]	2.0km, West/ 6.3km,West	<p>There will be no direct effects as the project footprint is located entirely outside the designated site.</p>

Designated Site	Distance from Proposed Development / Grid Connection route (km)	Likely Zone of Impact Determination
		<p>The Grid Connection route of the Proposed Development crosses the Ballyglass River, which in turn flows into the SAC, and therefore potential indirect effects exists in relation to deterioration in water quality.</p> <p>The site is <i>within</i> the likely zone of impact and further consideration is required.</p>
<p>Castle Ffrench East Bog [NHA 001244]</p>	<p>8.1km, West/ 12.1km West</p>	<p>There will be no direct effects as the project footprint is located entirely outside the designated site.</p> <p>Due to the karst nature of the surrounding landscape there is a potential for impacts of a deterioration in water quality on this site via groundwater pathways.</p> <p>The site is <i>within</i> the likely zone of impact and further consideration is required.</p>
<p>Annaghbeg Bog NHA [002344]</p>	<p>6.6km South-west / 11.3km South-west</p>	<p>There will be no direct effects as the application site is located entirely outside the designated site.</p> <p>Due to the karst nature of the surrounding landscape there is a potential for impacts of a deterioration in water quality on this site via groundwater pathways.</p> <p>The site is <i>within</i> the likely zone of impact and further consideration is required.</p>
<p>Ballygar Bog NHA</p>	<p>7.7km, North-west / 8.3km North-west</p>	<p>There will be no direct effects as the application site located entirely outside the designated site.</p> <p>Due to the karst nature of the surrounding landscape there is a potential for impacts of a deterioration in water quality on this site via groundwater pathways.</p> <p>The site is <i>within</i> the likely zone of impact and further consideration is required.</p>
<p>Castle French West Bog NHA [000280]</p>	<p>6.5km West / 13.8km West</p>	<p>There will be no direct effects as the application site is located entirely outside the designated site.</p> <p>Due to the karst nature of the surrounding landscape there is a potential for impacts of a deterioration in water quality on this site via groundwater pathways.</p> <p>The site is <i>within</i> the likely zone of impact and further consideration is required.</p>

Designated Site	Distance from Proposed Development / Grid Connection route (km)	Likely Zone of Impact Determination
Aughrim Bog NHA [001227]	9.3km, North-west/ 15.7km North-west	<p>There will be no direct effects as the application site is located entirely outside the designated site.</p> <p>Due to the karst nature of the surrounding landscape there is a potential for impacts of a deterioration in water quality on this site via groundwater pathways.</p> <p>The site is <i>within</i> the likely zone of impact and further consideration is required.</p>
Killure Bog NHA	9.9km, South-west / 14.4km South-west	<p>There will be no direct effects as the application site is located entirely outside the designated site.</p> <p>Due to the karst nature of the surrounding landscape there is a potential for impacts of a deterioration in water quality on this site via groundwater pathways.</p> <p>The site is <i>within</i> the likely zone of impact and further consideration is required.</p>
Carrickynaghtan Bog NHA	11.1km South-east / 2.8km South	<p>There will be no direct effects as the application site is located entirely outside the designated site.</p> <p>Due to the karst nature of the surrounding landscape there is a potential for impacts of a deterioration in water quality on this site via groundwater pathways.</p> <p>The site is <i>within</i> the likely zone of impact and further consideration is required.</p>
Crit Island West NHA	11.6km, South-west / 16.3km South-west	<p>There will be no direct effects as the application site is located entirely outside the designated site.</p> <p>Due to the karst nature of the surrounding landscape there is a potential for impacts of a deterioration in water quality on this site via groundwater pathways.</p> <p>The site is <i>within</i> the likely zone of impact and further consideration is required.</p>
Kilmore Bog NHA	12.1km North-west / 19km North-west	<p>There will be no direct effects as the application site is located entirely outside the designated site.</p> <p>Due to the karst nature of the surrounding landscape there is a potential for impacts of a deterioration in water quality on this site via groundwater pathways.</p>

Designated Site	Distance from Proposed Development / Grid Connection route (km)	Likely Zone of Impact Determination
		<p>The site is <i>within</i> the likely zone of impact and further consideration is required.</p>
<p>Proposed Natural Heritage Area (pNHA)</p>		
<p>Feacle Turlough pNHA [001634]</p>	<p>0.09km (EIAR Site Boundary is within 85m of the nearest portion of the pNHA) / 1.9km South</p>	<p>There will be no direct effects as the application site is located entirely outside the designated site.</p> <p>Due to the karst nature of the surrounding landscape there is the potential for indirect effects from a deterioration in water quality on this site via groundwater pathways.</p> <p>The site is <i>within</i> the likely zone of impact and further consideration is required.</p>
<p>Lough Croan Turlough pNHA (000610)</p>	<p>0.8km, North / 3.5km North-west</p>	<p>There will be no direct effects as the application site is located entirely outside the designated site.</p> <p>No surface water drainage features have been identified within the Proposed Development site. The pNHA is designated for turlough habitat.</p> <p>The detailed hydrological assessment (see Section 9.4.2.9, Chapter 9 of the this EIAR) has concluded that Lough Croan is not hydraulically connected to groundwater flows below the proposed Norther Cluster of the Wind Farm site. Therefore, no potential pathway for effect via groundwater pathways have been identified between the Proposed Development and the pNHA.</p> <p>The site is <i>not</i> within the likely zone of impact.</p>
<p>Castlesampson Esker pNHA(001625)</p>	<p>1.7km, South / 4.5km South</p>	<p>There will be no direct effects as the application site is located entirely outside the designated site.</p> <p>No surface water drainage features have been identified within the Proposed Development site. Detailed hydrological assessments carried out at the site (see Section 9.4.2.9, Chapter 9 'Water and Hydrology' of the EIAR) have concluded that regional groundwater flow from the Proposed Development site is not in the direction of the Castlesampson Esker pNHA. No potential for impacts due to a deterioration in water quality via groundwater pathways on the aquatic receptors of this pNHA therefore exists.</p>

Designated Site	Distance from Proposed Development / Grid Connection route (km)	Likely Zone of Impact Determination
		<p>The pNHA is therefore <i>not</i> within the Likely Zone of Impact.</p>
<p>Four Roads Turlough pNHA (001637)</p>	<p>2.3km, North/ 8.1km North-west</p>	<p>There will be no direct effects as the application site is located entirely outside the designated site.</p> <p>No surface water drainage features have been identified within the Proposed Development site. The possibility of groundwater reaching Four Roads Turlough cannot be discounted. Proposed drainage mitigation is outlined in respect of the potential impact pathways.</p> <p>The site is <i>within</i> the likely zone of impact and further consideration is required.</p>
<p>Lough Funshinagh pNHA [000611]</p>	<p>4.5km, North-east/ 5km North-east</p>	<p>There will be no direct effects as the application site is located entirely outside the designated site.</p> <p>No surface water drainage features have been identified within the Proposed Development site. The detailed hydrological assessment (see Section 9.4.2.9, Chapter 9 of the accompanying EIAR) has concluded that there is no hydraulic connection between the Wind Farm site and Lough Funshinagh. As such, none of the impact pathways can occur at Lough Funshinagh pNHA in respect of the Proposed Development..</p> <p>The pNHA is therefore <i>not</i> within the Likely Zone of Impact.</p>
<p>Lisduff Turlough pNHA [000609] (also designated and an SAC)</p>	<p>6.4km, North/ 11.5km, North-west</p>	<p>There will be no direct effects as the application site is located entirely outside the designated site.</p> <p>The detailed hydrological assessment (see Section 9.4.2.9, Chapter 9 of the accompanying EIAR) has concluded that, due to an area of high ground wrapping around the southern and eastern flanks of the Lisduff turlough pNHA acting as a hydraulic boundary, there is no potential for indirect effects resulting from a deterioration in water quality via groundwater pathways on this SAC.</p> <p>These pNHA is <i>not</i> within the Likely Zone of Impact.</p>
<p>Lough Ree pNHA [000440]</p>	<p>8.0km, east/ 1.5km, North-east</p>	<p>There will be no direct effects as the application site is located entirely outside the designated site.</p>

Designated Site	Distance from Proposed Development / Grid Connection route (km)	Likely Zone of Impact Determination
		<p>The detailed hydrological assessment (see Section 9.4.2.9, Chapter 9 of the accompanying EIAR) has concluded that no groundwater connectivity exists between the site of the Proposed Development and this pNHA, and therefore there is no pathway for effects on the pNHA via deterioration in water quality.</p> <p>This pNHA is <i>not</i> within the Likely Zone of Impact.</p>
Cranberry Lough pNHA [001630]	8.5km, South-east / 11.5km, South	<p>There will be no direct effects as the EIAR boundary is located entirely outside the designated site.</p> <p>Due to the lack of aquatic features within the site of the Proposed Development and the lack of hydrological connectivity, no pathway for significant indirect effects on water quality of supporting wetland habitat exists.</p> <p>This pNHA is <i>not</i> within the Likely Zone of Impact.</p>
Ballinturly Turlough pNHA	10.4km, Northwest/ 15.2km, North-west	<p>There will be no direct effects as the EIAR boundary is located entirely outside the designated site.</p> <p>Due to the lack of aquatic features within the site of the Proposed Development and the lack of hydrological connectivity, no pathway for significant indirect effects on water quality of supporting wetland habitat exists.</p> <p>This pNHA is <i>not</i> within the Likely Zone of Impact.</p>
River Shannon Callows pNHA [000216]	11.1km, East/ 1.3km South-east	<p>There will be no direct effects as the EIAR boundary is located entirely outside the designated site.</p> <p>The proposed Grid Connection route crosses the Cross River at an existing crossing, which in turn flows into the pNHA, and therefore potential indirect effects exists in relation to deterioration in water quality.</p> <p>This pNHA is <i>within</i> the Likely Zone of Impact.</p>
Ballinasloe Esker pNHA [001779]	11.6km, South-west/ 15.6km, South-west	<p>There will be no direct effects as the EIAR boundary is located entirely outside the designated site.</p>

Designated Site	Distance from Proposed Development / Grid Connection route (km)	Likely Zone of Impact Determination
		<p>Due to the lack of aquatic features within the site of the Proposed Development and the lack of hydrological connectivity, no pathway for significant indirect effects on water quality of supporting wetland habitat exists.</p> <p>This pNHA is <i>not</i> within the Likely Zone of Impact.</p>

6.5.1.2 National Parks and Wildlife Service (NPWS) Article 17 Reporting

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

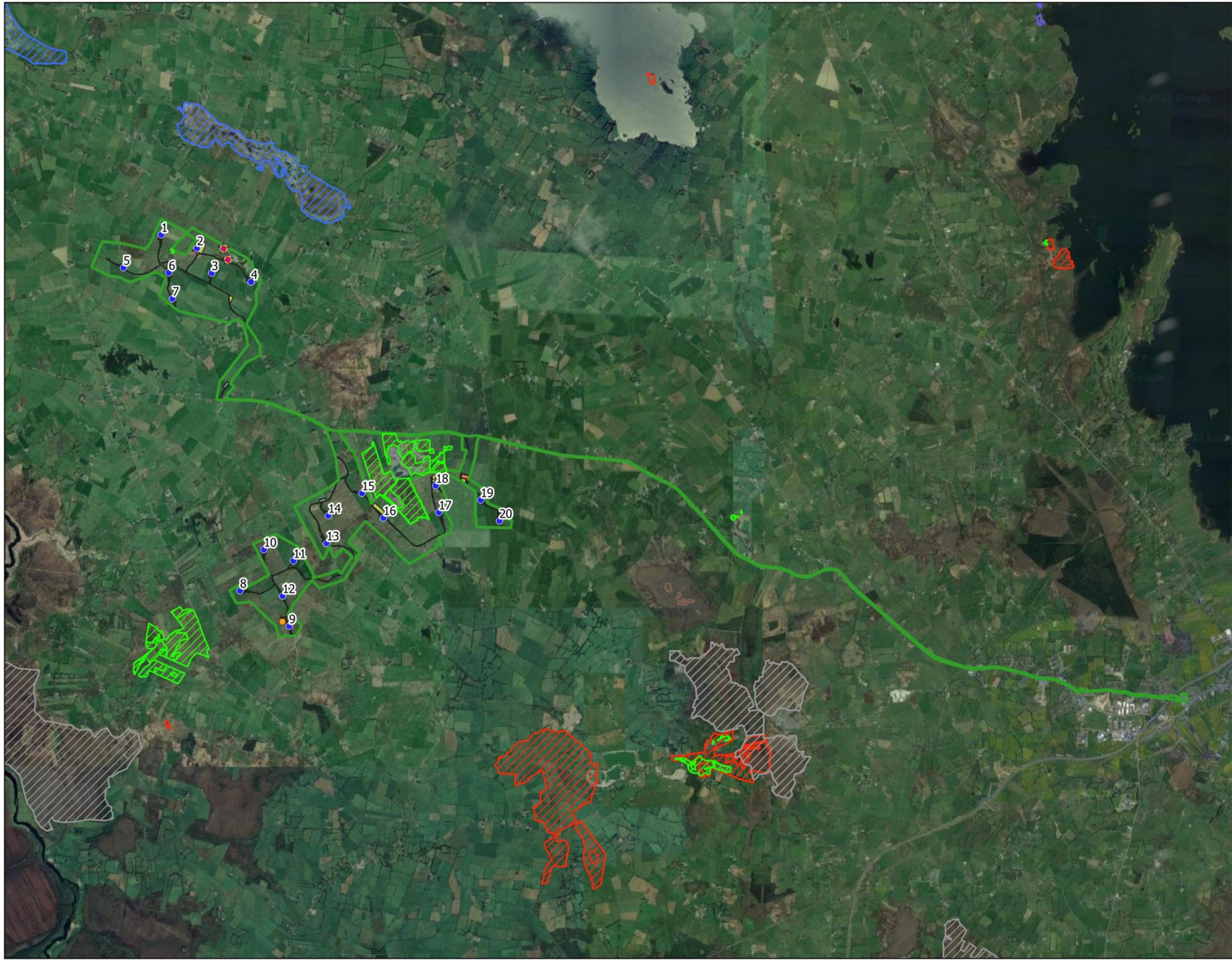
The desk study involved a search of information pertinent to the survey area within the EIAR Site Boundary. Initially the NPWS designated site datasets were consulted. An area of grassland to the west of the site has been designated as the Killegran Grassland Special Area of Conservation (SAC). The SAC is located approximately 400 metres to the southwest of the site at its closest and has been designated for the Habitats Directive Annex I habitat ‘Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (*important orchid sites) [6210]’, referred to hereafter as ‘Calcareous grassland (6210/6210*)’.

Following a review of the Irish Semi-natural Grasslands Survey (ISGS) (2007-2012) (O’Neill, *et al*, 2013), some small areas of the lands within the EIAR boundary were surveyed as part of the ISGS and were found to correspond to that the Habitats Directive Annex I habitat 6210 grassland.

The most recent Article 17 report on ‘*The Status of EU Protected Habitats and Species in Ireland*’ (NPWS, 2019) states that this habitat has an overall conservation status of ‘bad’ and that the area is ‘bad’.

Areas of the Habitats Directive Annex I priority habitat Limestone pavement [8240] have been mapped as part of the 2013 Article 17 reporting and are located approx. 4.5km to the north of the Proposed Development at their closest. Based on the proximity of this limestone pavement, consideration was also given to the likelihood of this habitat occurring within the site when undertaking the detailed botanical surveys in 2020. This habitat was not found to occur within the Proposed Development site.

The location of mapped Annex I habitat as part of the 2013 Article 17 reporting is shown in Figure 6-7.



Map Legend

- EIAR Site Boundary
- Active Raised Bog
- Dry Heath
- Orchid Rich Calcareous Grassland
- Turloughs
- Proposed Turbine Layout

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Site in relation to mapped Annex 1 habitats	
Project Title: Seven Hills Wind Farm, Co. Roscommon	
Drawn By: PE	Checked By: JH
Project No.: 190907	Figure No.: 6-7
Scale: 1:50000	Date: 2022-06-01

MKO Planning and Environmental Consultants
 Turn Road, Galway
 Ireland, H91 VW84
 +353 (0)91 733611
 email: info@mkoreland.ie
 Website: www.mkoreland.ie

6.5.1.3 Vascular plants

A search was made in the New Atlas of the British and Irish Flora (Preston *et al*, 2002) to investigate whether any rare or unusual plant species listed under Annex II of the EU Habitats Directive, The Irish Red Data Book - 1 Vascular Plants (Curtis, 1988) or the Flora (Protection) Order (1999, as amended 2015) had been recorded in the relevant 10km squares in which the Proposed Development is situated (M84 and M94). Each hectad contains 100 whole one kilometre squares containing terrestrial habitats. Species of conservation concern are given in Table 6-5. No species listed in Annex II of the Habitats Directive or the Flora (Protection) Order are shown in the atlas for squares M84 and M94.

Table 6-5: Species listed designated under the Flora Protection Order or the Irish Red Data Book within Hectad M84 & M94

Common Name	Hectad	Status
Blue Fleabane (<i>Erigeron acer</i>)	M94	EN
Northern yellowcress (<i>Rorippa islandica</i>)	M84 + M94	VU
Corn Marigold (<i>Chrysanthemum segetum</i>)	M84	NT
Narrow-leaved helleborine (<i>Cephalanthera longifolia</i>)	N04	VU, FPO
Green-winged orchid (<i>Orchis morio</i>)	M84 + M94 + N04	VU
Basil Thyme (<i>Clinopodium acinos</i>)	M94	NT
Red Hemp-nettle (<i>Galeopsis augustifolia</i>)	N04	VU, FPO
Prickly Poppy (<i>Papaver argemone</i>)	N04	VU
Irish Whitebeam (<i>Sorbus hibernica</i>)	N04	VU
Common Hedgenettle (<i>Stachys officinalis</i>)	N04	NT
Upright Brome (<i>Bromopsis erecta</i>)	N04	NT
Smooth Brome (<i>Bromus racemosus</i>)	N04	NT
Greater Knapweed (<i>Centaurea scabiosa</i>)	N04	NT
Fibrous Tussock-sedge (<i>Carex appropinquate</i>)	N04	NT
Tubular Water-dropwort (<i>Oenanthe fistulosa</i>)	N04	NT
Frog Orchid (<i>Coeloglossum viride</i>)	M94	NT
Field Gentain (<i>Gentianella campestris</i>)	M94	NT
Dense-flowered Orchid (<i>Neotinea maculata</i>)	M94	NT
Small Bur-reed (<i>Sparganium natans</i>)	M94 + N04	NT
Brown-beak sedge (<i>Rhynchospora fusca</i>)	M84 + N04	NT
Autumn Lady's-tresses (<i>Spiranthes spiralis</i>)	M84 + M94 + N04	NT
Marsh Fern (<i>Thelypteris palustris</i>)	N04	NT

Small White Orchid (<i>Pseudochris albida</i>)	M94	FPO
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Near Threatened (NT), Vulnerable (VU), Critically Endangered (CR), Regionally Extinct (RE)

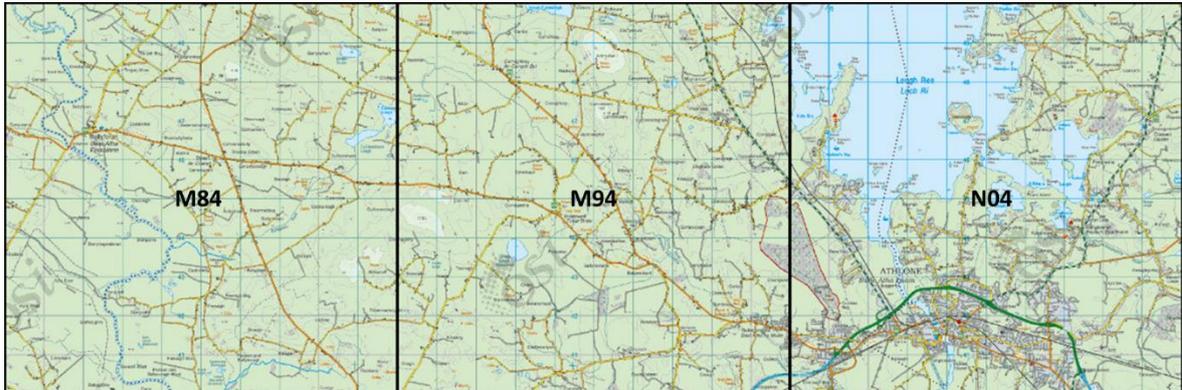


Figure 6-8: 10km Grid squares used for desk study queries

6.5.1.4 Bryophytes

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

6.5.1.5 National Biodiversity Data Centre (NBDC) Records

A search of the National Biodiversity Data Centre (NBDC) website was conducted on the 17/05/2022. This helped to inform survey effort and provide a baseline of likely species composition in the area. Records of protected fauna recorded from hectads M84 and M94 are provided in Table 6-6.

Table 6-6: NBDC records for protected species and species of conservation interest (excl. birds) in hectads M84 and M94

Common Name (Scientific Name)	Date of Last Record	Designation	Hectad
Insects			
<i>Agabus (Agabus) labiatus</i>	26/06/1983	Near threatened	M94
<i>Helophorus (Helophorus) nanus</i>	03/12/2001	Vulnerable	M84
Dingy Skipper (<i>Erynnis tages</i>)	28/05/2018	Near threatened	M84 + M94
Marsh Fritillary (<i>Euphydryas aurinia</i>)	03/09/2018	Annex II; Vulnerable	M84 + M94 + N04
Moss Carder-bee (<i>Bombus (Thoracomus) muscorum</i>)	30/08/2015	Near threatened	M84 + M94
Scarce Emerald Damselfly (<i>Lestes dryas</i>)	16/08/2002	Near threatened	M94
Small Blue (<i>Cupido minimus</i>)	28/05/2018	Endangered	M84
Small Heath (<i>Coenonympha pamphilus</i>)	31/08/2017	Near threatened	M84
Wall butterfly (<i>Lasiommata megera</i>)	31/08/2017	Endangered	M84 + M94

Gipsy Cuckoo Bee (<i>Bombus (Psithyrus) bohemicus</i>)	25/03/2012	Near threatened	M84
Large Red Tailed Bumble Bee (<i>Bombus (Melanobombus) lapidarius</i>)	26/08/2017	Near threatened	M84 + M94
Moss Carder-bee (<i>Bombus (Thoracombus) muscorum</i>)	28/05/2018	Near threatened	M84 + M94
<i>Nomada obtusifrons</i>	30/07/2004	Endangered	M84
Red-tailed Carder Bee (<i>Bombus (Thoracombus) ruderarius</i>)	27/07/2010	Vulnerable	M84
Shrill Carder Bee (<i>Bombus (Thoracombus) sylvarum</i>)	27/07/2010	Endangered	M84
<i>Labiobaetis atrebatinus</i>	31/12/1979	Endangered	M84
<i>Procloeon bifidum</i>	31/12/1979	Vulnerable	M84
Mollusc			
Common Whorl Snail (<i>Vertigo (Vertigo) pygmaea</i>)	25/09/2006	Near threatened	M84
Desmoulin's Whorl Snail (<i>Vertigo (Vertigo) moulinsiana</i>)	25/09/2006	Annex II; WA; Endangered	M84 + M94
English Chrysalis Snail (<i>Leiostryla (Leiostryla) anglica</i>)	14/08/1972	Vulnerable	M84
Heath Snail (<i>Helicella itala</i>)	14/08/1972	Vulnerable	M84 + M94
Marsh Whorl Snail (<i>Vertigo (Vertigo) antivertigo</i>)	25/09/2006	Vulnerable	M84 + M94
Moss Bladder Snail (<i>Aplexa hypnorum</i>)	14/08/1972	Vulnerable	M84
Smooth Grass Snail (<i>Vallonia pulchella</i>)	25/09/2006	Vulnerable	M84 + M94
Swan Mussel (<i>Anodonta (Anodonta) cygnea</i>)	31/12/1965	Vulnerable	M84
Whirlpool Ramshorn (<i>Anisus (Disculifer) vortex</i>)	24/09/2006	Vulnerable	M84 + M94
White-clawed Crayfish (<i>Austropotamobius pallipes</i>)	26/07/2017	WA, Annex II, V	N04
Amphibian			
Common Frog (<i>Rana temporaria</i>)	31/12/1979	Annex V; WA	M94 + N04
Smooth Newt (<i>Lissotriton vulgaris</i>)	02/09/2019	WA	M84 + M94 + N04
Terrestrial Mammal			

Eurasian Badger (<i>Meles meles</i>)	31/12/2016	WA	M84 + M94
Eurasian Pygmy Shrew (<i>Sorex minutus</i>)	03/09/2018	WA	M94
Eurasian Red Squirrel (<i>Sciurus vulgaris</i>)	31/12/2012	WA	M84
European Otter (<i>Lutra lutra</i>)	23/05/2012	Annex II; Annex IV; WA	M84 + M94
Pine Marten (<i>Martes martes</i>)	01/07/2016	Annex V; WA	M84 + M94
West European Hedgehog (<i>Erinaceus europaeus</i>)	13/02/1969	WA	M84

HD Annex I, Annex II, Annex IV, Annex V = EU Habitats Directive; WA = Wildlife Acts (Ireland); IUCN – Status on Threatened Species List

6.5.1.6 Bat Records

An information request form was sent to Bat Conservation Ireland to gather information on bat roosts and species composition within 1km and 10km of a central point within the Northern and Southern clusters (Grid Ref: E186656 N247682 and E189455 N244200). Available bat records were provided by Bat Conservation Ireland on 04/03/2022. The search yielded no results of roosts within a 1km radius of the Northern or Southern packages of the Proposed Development. The search was extended to include a 10km radius including roosts, transects and ad-hoc observations. A number of transects (n=2) and ad-hoc observations (n=49 including overlapping records) have been recorded. At least six of Ireland’s nine resident bat species were recorded within 10 km of the proposed works including common and soprano pipistrelle, Leisler’s bat, Daubenton’s bat, Natterer’s bat and brown long-eared bat, as well as several records of unidentified bats. The results of the database search are provided in Table 4-1 of the Bat Report (see Appendix 6-2).

Bat records were also searched from the National Biodiversity Data Centre (NBDC) website, the results of which are provided in Table 6-7 below.

Table 6-7 NBDC records for bats within hectads M84 and M94

Common Name (Scientific Name)	Date of Last Record	Designation	Hectad
Mammal (bat)			
Brown Long-eared Bat (<i>Plecotus auritus</i>)	17/07/2011	Annex IV; WA	M94 + N04
Daubenton's Bat (<i>Myotis daubentonii</i>)	13/08/2009	Annex IV; WA	M84 + N04
Leisler's bat (<i>Nyctalus leisleri</i>)	17/07/2011	Annex IV; WA	M84 + M94 + N04
Common pipistrelle (<i>Pipistrellus sensu lato</i>)	07/07/2011	Annex IV; WA	M84 + M94 + N04
Soprano Pipistrelle (<i>Pipistrellus pygmaeus</i>)	21/06/2011	Annex IV; WA	M84 + M94

6.5.1.7 NPWS Protected Species Records

National Parks and Wildlife Service (NPWS) online records were searched to see if any rare or protected species of flora or fauna have been recorded within 5km of the Proposed Development. An information request was also sent to the NPWS scientific data unit requesting records from the Rare

and Protected Species Database. A response was received on the 14th April 2022. Table 6-8 lists rare and protected species records obtained from NPWS.

Table 6-8: NPWS records for rare and protected species

Common name (Scientific Name)	Designation	Hectad
Basil thyme (<i>Clinopodium acinos</i>)	EN	M94, N04
Blue fleabane (<i>Erigeron acer</i>)	EN	M94
Bog pincerwort (<i>Cephalozia macrostachya</i>)	N/A	M94
Chalk hook-moss (<i>Drepanocladus sendtneri</i>)	NT	M94
Common Lizard (<i>Zootoca vivipara</i>)	WA	M94 + N04
Narrow-leaved helleborine (<i>Cephalanthera longifolia</i>)	VU, FPO	N04
Prickly Poppy (<i>Papaver argemone</i>)	VU	N04
Red Hemp-nettle (<i>Galeopsis augustifolia</i>)	VU, FPO	N04
Upright Brome (<i>Bromopsis erecta</i>)	NT	N04
Short-leaved Water-starwort (<i>Callitriche truncate</i>)	VU	N04
Reindeer lichen (<i>Cladonia ciliate</i>)	HD Annex V	M84, M94
Green-winged orchid (<i>Orchis morio</i>)	EN	M84, M94, N04
Marsh Fern (<i>Thelypteris palustris</i>)	NT	N04
Lustrous Bog-moss (<i>Sphagnum subnitens</i>)	N/A	M94
Northern yellow-cress (<i>Rorippa islandica</i>)	VU	M84, M94
Orange foxtail (<i>Alopecurus aequalis</i>)	N/A	M94
Papillose Bog-moss (<i>Sphagnum papillosum</i>)	N/A	M94
Reindeer moss (<i>Cladonia portentosa</i>)	HD Annex V	M84, M94
Rusty bog-moss (<i>Sphagnum fuscum</i>)	LC	M94
Desmoulin's Whorl Snail (<i>Vertigo moulinsiana</i>)	HD Annex II; WA; EN	M84, M94, N04
Freshwater crayfish (<i>Austroptamobius pallipes</i>)	HD Annex II, V; WA	M84, M94, N04
Common frog (<i>Rana temporaria</i>)	HD Annex V, WA	M94, N04
Irish Hare (<i>Lepus timidus</i> subsp. <i>Hibernicus</i>)	Annex V, WA	M84, M94, N04
Badger (<i>Meles meles</i>)	WA	M84, M94, N04
Brown hare (<i>Lepus europaeus</i>)	WA	M84
European otter (<i>Lutra lutra</i>)	HD Annex II, IV, WA	M84, M94, N04
Fallow deer (<i>Dama dama</i>)	WA	M84

Common name (Scientific Name)	Designation	Hectad
Irish Hare (<i>Lepus timidus</i> subsp. <i>Hibernicus</i>)	Annex V, WA	M84, M94, N04
Irish stoat (<i>Mustela erminea</i> subsp. <i>Hibernica</i>)	WA	M84
Pine marten (<i>Martes martes</i>)	HD Annex V, WA	M84, N04
West European hedgehog (<i>Erinaceus europaeus</i>)	WA	M84, M94

FPO = Flora Protection Order; RL = Red List, VU = Vulnerable, WA = Wildlife Act

6.5.1.8 Inland Fisheries Ireland Data

The IFI online database was reviewed for fish species records within the catchments downstream of the application site. The Grid Connection route component of the Proposed Development crosses existing watercourses at 5 locations that are tributaries of both the Suck (to the west) and Shannon [Upper] (to the east). A search of the Inland Fisheries Ireland (IFI) online database was carried out to determine the species richness of the downstream watercourses (i.e. outside of the EIAR Site Boundary but connected by tributaries crossed by the Grid Connection route). The results are presented in Table 6-9¹⁰.

Table 6-9: Water quality monitoring stations and associated Q value

Station Name	Species	Draft Fish Ecological Status	Assessment Year
Cross River IFI Site Name: Br. u/s Shannon River_A Site Code: 26C100400A	Brown trout; Gudgeon; Perch; Pike; Roach	Moderate	2008
River Shannon (Upper) Site Name: Bunaribba_A Site Code: 26S021720A	European eel; Perch; Pike; Roach	Moderate	2010
River Suck Site Name: Ballyforan Br._A Site Code: 26S071100A	European eel; Gudgeon; Minnow; Perch; Pike; Roach; Stone loach	Moderate	2013

Further information was provided by the IFI as part of a scoping response; the value of the Ballyglass River as a good mixed stock fishery, with stocks of brown trout, salmon and coarse fish species was highlighted.

European Eel is listed as Critically Endangered in the Irish Red List. All three species of lamprey are listed in Annex II of the Habitats Directive.

¹⁰ IFI National Research Survey Programme, Online, Available at: <https://ifigis.maps.arcgis.com/apps/webappviewer/index.html?id=9a31fedb077c4fb2991184842b7ef025>, Accessed: 17/09/2020

6.5.1.9 Water Quality

The River Basin Management Plan 2018 - 2021 has been published for the single national River Basin District in accordance with the requirements of the Water Framework Directive. The online EPA Envision map viewer provides access to water quality information and individual waterbody status in Ireland. The EPA Envision map viewer was consulted regarding the water quality status of the rivers which run within and directly adjacent to the Survey Area. A summary is provided in Table 6-10 below.

Table 6-10: Watercourses along Grid Connection route with relevant water quality status

Name (European Code)	Ecological Status	Risk Status
Suck (IE_SH_26S071200)	Good	Under Review
Killeglan (IE_SH_26K040200)	Moderate	At Risk
Cross_010 (IE_SH_26C100060)	Poor	At Risk
Cross_020 (IE_SH_26C100200)	Good	Not at Risk

Status- WFD River Waterbody Status 2013-2018 Risk - WFD River Waterbodies Risk

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

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

Watercourse Name	Sampling Station	Sampling Year	Q-Value & Water Quality Status
The Cross River (26C10)	RS26C100060,	2020	Q 3-4 - Moderate
The Cross River (26C10)	RS26C100200,	2020	Q 3-4 - Moderate
The Cross River (26C10)	RS26C100300,	2020	Q 3-4 - Moderate
The Cross River (26C10)	RS26C100400	2020	Q 3-4 - Moderate

A full hydrological assessment has been carried out by Hydro Environmental Services Ltd. on behalf of MKO (see Chapter 9 – Water); the assessment concludes that there will be no significant effects on any aquatic receptors as a result of the Proposed Development. Given that there is no potential for significant effects on water quality, there is no possibility that the Proposed Development will cause any deterioration in status of all bodies of surface water / groundwater, or jeopardise the objectives to achieve good surface water status or good ecological potential, as appropriate, jeopardise the attainment of good surface water chemical status or permanently exclude or compromise the achievement of the objectives of the WFD in other bodies of water within the same river basin district.

6.5.1.10 Freshwater Pearl Mussel (*Margaritifera margaritifera*)

The NPWS *Margaritifera* Sensitive Area map (Version 8, 2017) was consulted during the desk study. No records of this species were found for the hydrological catchment within which the Proposed Development site is located, and the site is not located within a mapped sensitive area for this species.

6.5.1.11 Invasive Species

The NBDC database also contains records of invasive species identified within the relevant hectads. Records of 'high impact' invasive species for hectads M84 and M94 are provided in Table 6-12.

Table 6-12: NBDC records for invasive species (hectads M84 and M94)

Name (scientific name in italics)	Date of last record	Status	Hectad
Canadian Waterweed (<i>Elodea canadensis</i>)	31/12/2010	High Impact	M84, N04
Rhododendron (<i>Rhododendron ponticum</i>)	10/04/2012	High Impact	M84, N04
Indian Balsam (<i>Impatiens glandulifera</i>)	17/10/2011	High Impact	N04
Butterfly-bush (<i>Buddleja davidii</i>)	05/12/2017	Medium impact	M94
Japanese Knotweed (<i>Fallopia japonica</i>)	05/10/2017	High impact	M94, N04
Sycamore (<i>Acer pseudoplatanus</i>)	30/08/2016	Medium impact	M84, M94
Common Garden Snail (<i>Cornu aspersum</i>)	14/08/1972	Medium impact	M84, M94
Jenkins' Spire Snail (<i>Potamopyrgus antipodarum</i>)	31/12/1965	Medium impact	M84, M94
Zebra Mussel (<i>Dreissena polymorpha</i>)	25/07/2017	High Impact	N04
Greylag Goose (<i>Anser anser</i>)	31/12/2001	WA	M84
American Mink (<i>Mustela vison</i>)	09/12/1991	High Impact	M84, M94, N04
Bank Vole (<i>Myodes glareolus</i>)	14/01/2011	Medium impact	M94
Brown Rat (<i>Rattus norvegicus</i>)	13/02/1969	High Impact	M84
Eastern Grey Squirrel (<i>Sciurus carolinensis</i>)	31/12/2012	High Impact	N04
European Rabbit (<i>Oryctolagus cuniculus</i>)	09/12/1991	Medium Impact	M84, M94
Fallow Deer (<i>Dama dama</i>)	10/04/2012	High Impact; WA	M84
Greater White-toothed Shrew (<i>Crocidura russula</i>)	06/06/2020	Medium impact	M94

Name (scientific name in italics)	Date of last record	Status	Hectad
House Mouse (<i>Mus musculus</i>)	13/02/1969	High Impact	M84
Roach (<i>Rutilus rutilus</i>)	31/12/1999	Medium Impact	N04

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

6.5.1.12 Marsh Fritillary (*Euphydryas aurinia*)

There is a single NBDC¹¹ record of the species within the southeast of the survey area. In addition, NPWS Article 17 data shows the occurrence of a marsh fritillary population within the Killeglan Grassland SAC outside the southwest of the site. The potential presence of marsh fritillary was also highlighted within the scoping response from the DAU (see Section 6.3). As a result, dedicated surveys for marsh fritillary were undertaken at the site as described in Section 6.4.3.3.3. The survey results are provided in Section 6.6.3.3.4 of this EIAR.

6.5.1.13 Conclusions of the Desktop Study

The desktop study has provided information about the existing environment in Hectads M84 and M94 within which the Proposed Development site is located. No surface watercourses are present within areas where Wind Farm infrastructure are proposed; however, the karst nature of the landscape has groundwater channels associated with it, and a number of watercourses occur along the Grid Connection route leading to downstream EU Designated Sites, which are further considered in the AA Screening Report and subsequent Natura Impact Statement prepared for the Proposed Development as follows:

- Ballynamona Bog and Corkip Lough SAC [002339]
- Lough Croan Turlough SAC (000610)
- Castlesampson Esker SAC (001625)
- Four Roads Turlough SAC (001637)
- Lough Funshinagh SAC [000611]
- River Shannon Callows SAC [000216]
- Lough Croan Turlough SPA (004139)
- River Suck Callows SPA [004097]
- Four Roads Turlough SPA (004140)
- Middle Shannon Callows SPA [004096]

Similarly, to the European Sites listed above, the following nationally designated sites have been identified as having potential hydrological connectivity to the Proposed Development site, and are considered within the impact assessment in Section 6.7:

- River Shannon Callows NHA
- Suck River Callows NHA [000222]
- Castle Ffrench East Bog NHA [001244]
- Annaghbeg Bog NHA [002344]

¹¹ 2011 record

- Ballygar Bog NHA
- Castle Ffrench West Bog NHA [000280]
- Aughrim Bog NHA [001227]
- Killure Bog NHA
- Carrickynaghtan Bog NHA
- Crit Island West NHA
- Kilmore Bog NHA
- Feacle Turlough pNHA [001634]
- Four Roads Turlough pNHA (001637) (also designated as an SAC and SPA)

The Killeglan Grassland SAC is located approximately 421 metres to the southeast of the site boundary. This SAC has been designated for Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210]. However, the site of the Proposed Development and all associated infrastructure as well as all activities associated with the Proposed Development are located entirely outside of the SAC.

The desk study identified that a variety of protected faunal species are known to occur within the survey area, including bats, marsh fritillary, otter and badger. The mammal species recorded during the desk study informed the survey methodologies undertaken during the site visits. The mammal species recorded within the relevant hectad have widespread range and distributions in Ireland and are likely to be recorded frequently throughout Ireland (Marnell et al, 2009¹²). The site is not located within a freshwater pearl mussel 'sensitive area'. The desk study also provided useful information to inform the ecological surveys undertaken on site as well as the identification of pathways for potential impact on sensitive ecological receptors.

6.6 Ecological Walkover Survey Results

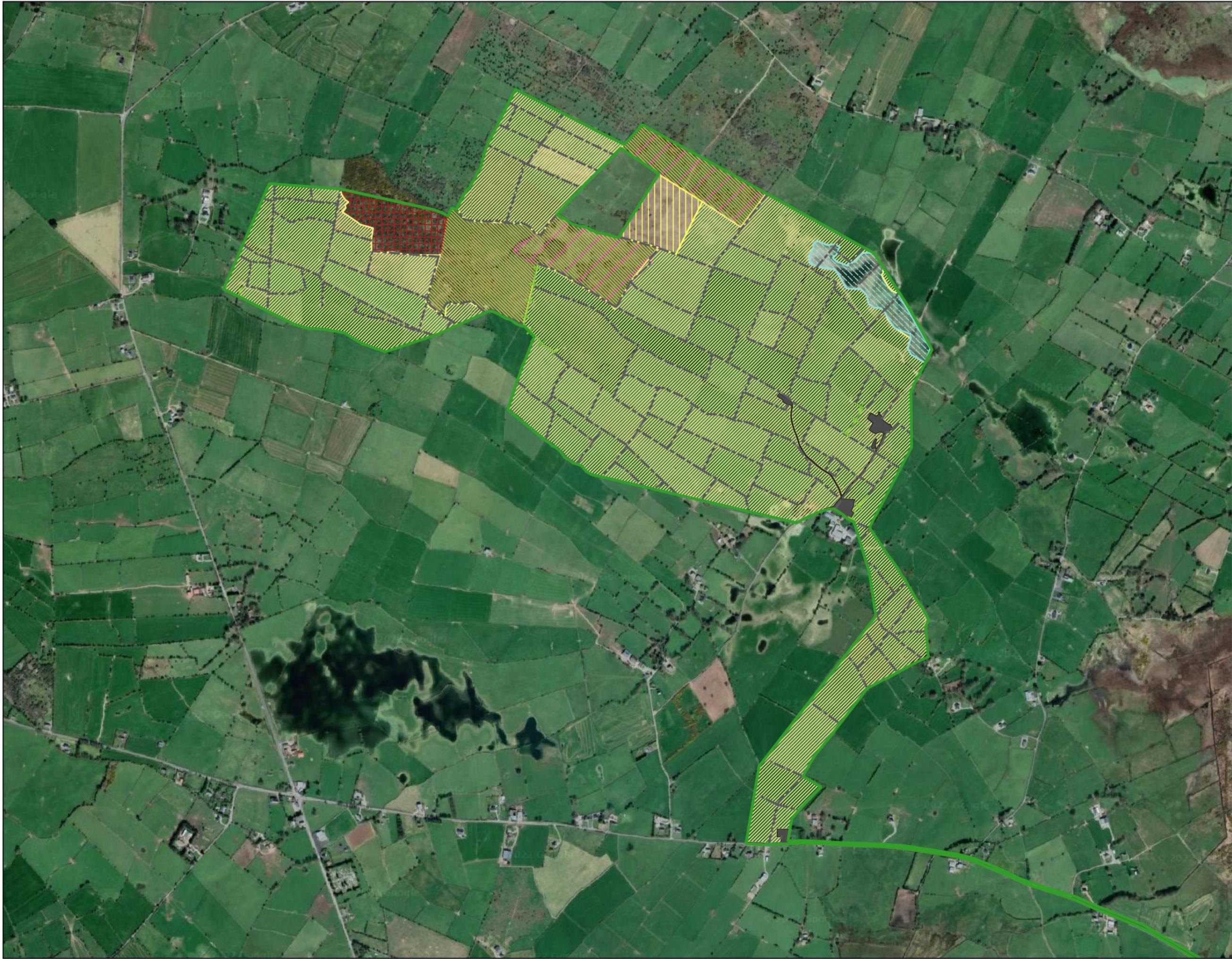
6.6.1 Description of Habitats and Flora within the Ecological Survey Area

A total of eleven habitats were recorded within the EIA boundary and the extended Survey Area (see Figure 6-2), including;

- Improved agricultural grassland (GA1)
- Dry calcareous and neutral grassland (GS1)
- Wet grassland (GS4)
- Scrub (WS1)
- Arable land (BC1)
- Turloughs (FL6) – Gortaphuill turlough is located within the EIA boundary (Northern Cluster); the Survey Area was extended to also include accessible areas of Feacle turlough within the wider landownership in order to ascertain baseline condition of this turlough and any potential for impacts.
- Stone walls (BL1)
- Hedgerows (WL1)
- Spoil and bare ground (ED2)
- Recolonising bare ground (ED3)
- Buildings and Artificial Surfaces (BL3)

¹²Marnell, F., Kingston, N. & Looney, D. (2009) Ireland Red List No. 3: Terrestrial Mammals, National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

Grassland habitats have been categorised to plant communities following the Irish Vegetation Classification (IVC). Detailed botanical data from relevés recorded in grassland habitats are provided in Appendix 6-1 of this EIAR. Habitat maps of the Northern and Southern clusters that form the site of the Proposed Development are provided in Figure 6-9, 6-10, 6-11 and 6-12.



Map Legend

-  EIAR Site Boundary
-  Arable crops
-  Stone walls and other stonework
-  Buildings and artificial surfaces
-  Spoil and bare ground
-  Recolonising bare ground
-  Turloughs
-  Improved agricultural grassland
-  Scrub
-  Areas of Annex 1 Priority Grassland
-  Hedgerows
-  Stone walls

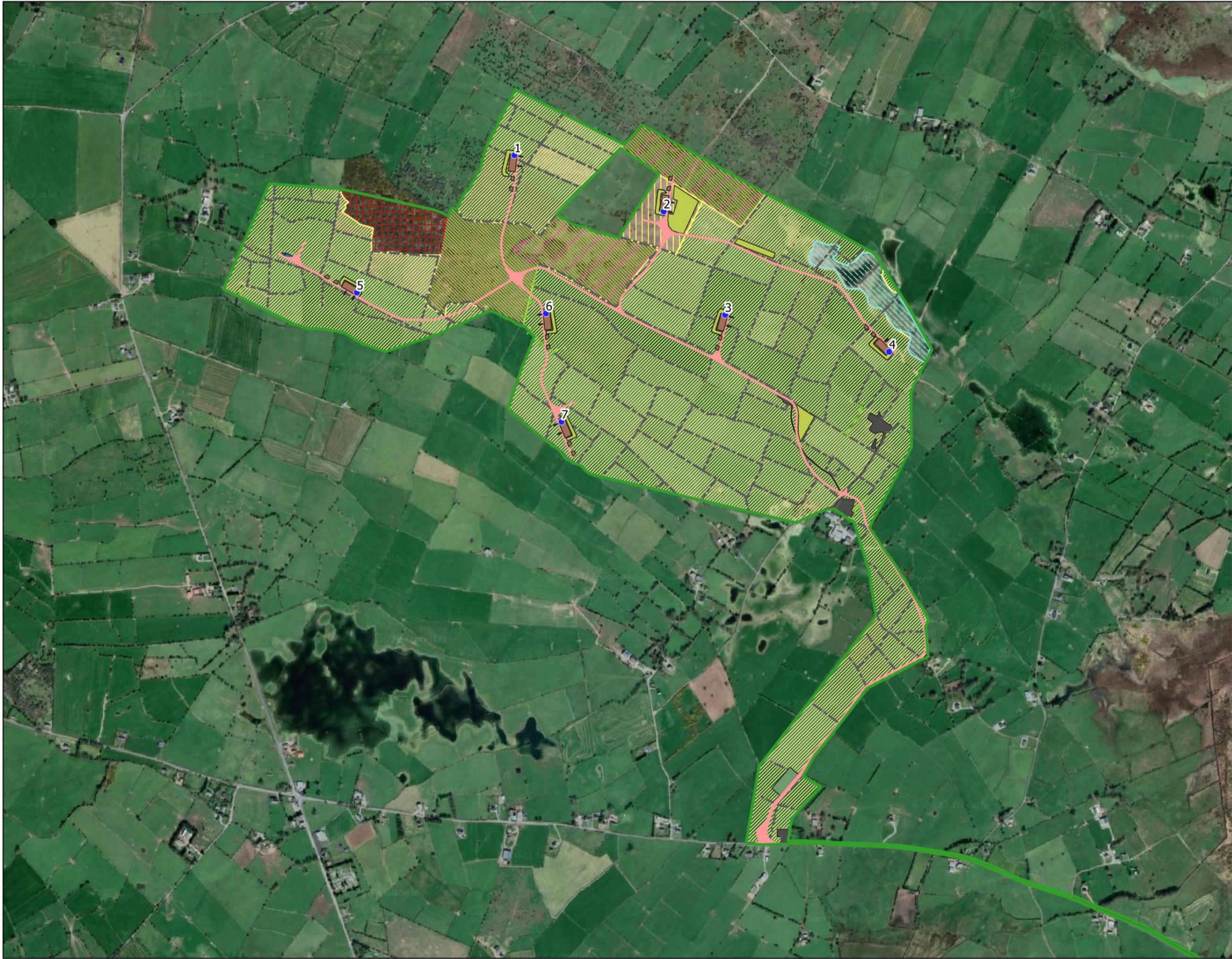
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Drawing Title	
Habitat Map - Northern Cluster	
Project Title	
Seven Hills Wind Farm, Co. Roscommon	
Drawn By	Checked By
PE	JH
Project No.	Figure No.
190907	6-9
Scale	Date
1:12000	2022-06-01

MKO Planning and Environmental Consultants

Town Road, Galway
 Ireland, H91 VW84
 +353 (0)91 733611
 email: info@mkoeireland.ie
 Website: www.mkoeireland.ie

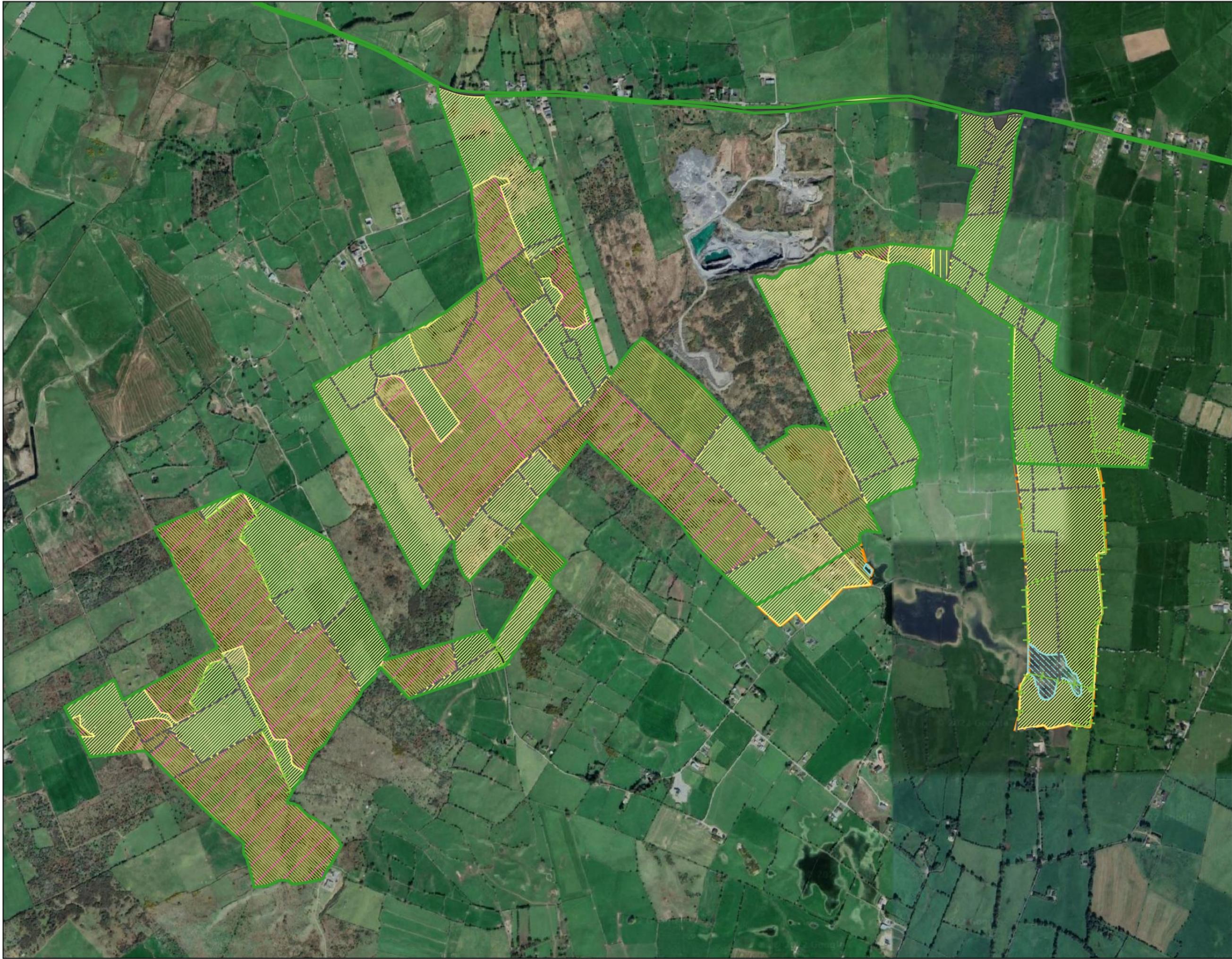


- ### Map Legend
- EIAR Site Boundary
 - Arable crops
 - Stone walls and other stonework
 - Buildings and artificial surfaces
 - Spoil and bare ground
 - Recolonising bare ground
 - Turloughs
 - Improved agricultural grassland
 - Scrub
 - Areas of Annex 1 Priority Grassland
 - Hedgerows
 - Stone walls
 - Turbine Locations
 - Proposed Hardstands
 - Proposed Substation Location
 - Proposed Spoil Storage Areas
 - Infrastructure Spoil Storage Areas
 - Met Mast Location
 - Proposed Construction Compound
 - Proposed Access Roads

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Drawing Title	
Habitat Map - Northern Cluster w/ Proposed Development	
Project Title	
Seven Hills Wind Farm, Co. Roscommon	
Drawn By	Checked By
PE	JH
Project No.	Figure No.
190907	6-10
Scale	Date
1:12000	2022-06-01

MKO
 Planning and Environmental Consultants
 Turn Road, Galway
 Ireland, H91 VW84
 +353 (0)91 733611
 email: info@mkoeireland.ie
 Website: www.mkoeireland.ie



Map Legend

-  EIA Site Boundary
-  Extended Survey Area
-  Arable crops
-  Stone walls and other stonework
-  Buildings and artificial surfaces
-  Spoil and bare ground
-  Recolonising bare ground
-  Turloughs
-  Improved agricultural grassland
-  Scrub
-  Areas of Annex 1 Priority Grassland
-  Hedgerows
-  Stone walls

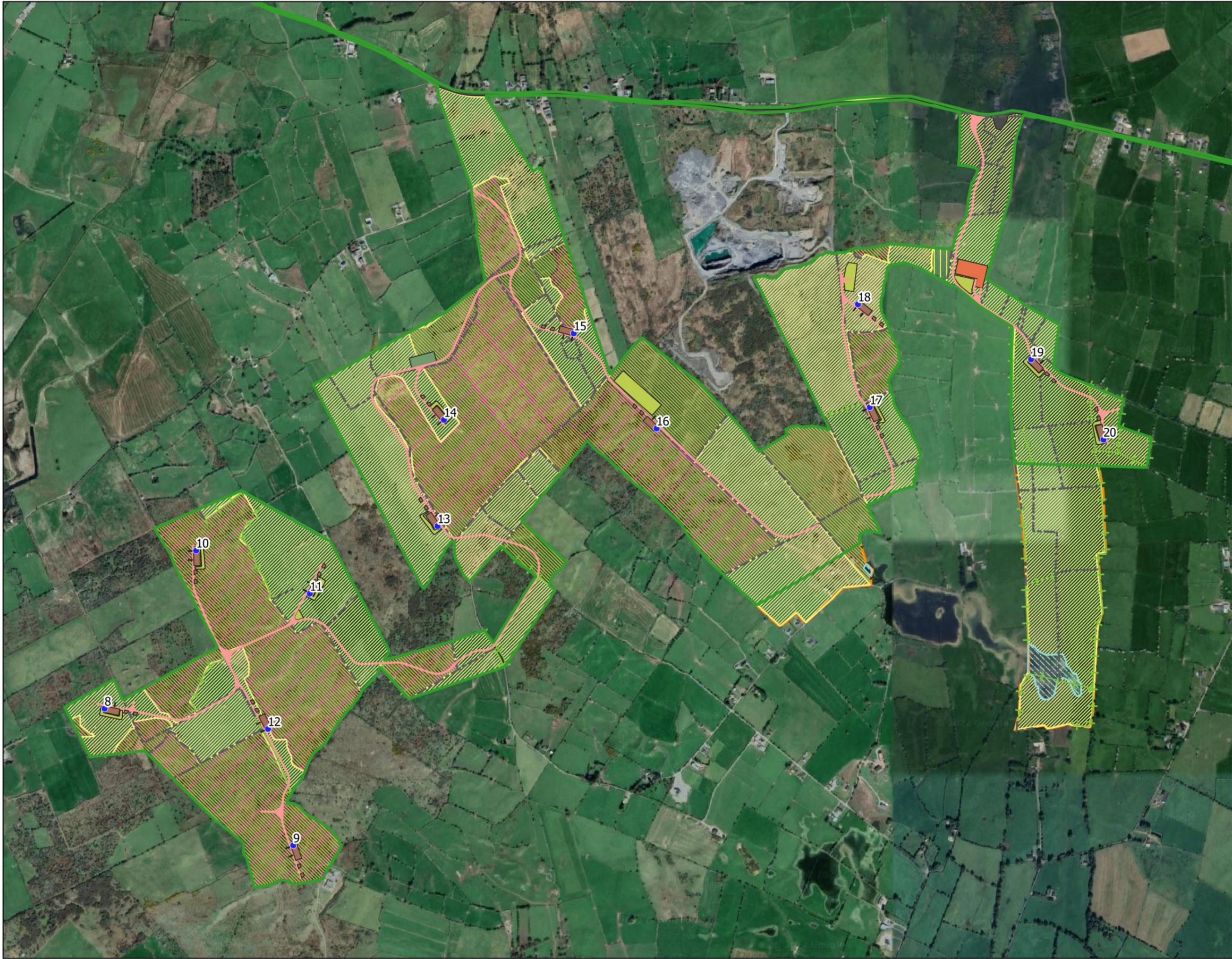


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Drawing Title	
Habitat Map - Northern Cluster	
Project Title	
Seven Hills Wind Farm, Co. Roscommon	
Drawn By	Checked By
PE	JH
Project No.	Figure No.
190907	6-11
Scale	Date
1:13000	2022-06-01

MKO Planning and Environmental Consultants

Town Road, Galway
 Ireland, H91 VW84
 +353 (0)91 733611
 email: info@mkoreland.ie
 Website: www.mkoreland.ie



- ### Map Legend
- EIAR Site Boundary
 - Extended Survey Area
 - Arable crops
 - Stone walls and other stonework
 - Buildings and artificial surfaces
 - Spoil and bare ground
 - Recolonising bare ground
 - Turloughs
 - Improved agricultural grassland
 - Scrub
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 - Hedgerows
 - Stone walls
 - Turbine Locations
 - Proposed Hardstands
 - Proposed Substation Location
 - Proposed Spoil Storage Areas
 - Infrastructure Spoil Storage Areas
 - Met Mast Location
 - Proposed Construction Compound
 - Proposed Access Roads

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Habitat Map - Northern Cluster	
Seven Hills Wind Farm, Co. Roscommon	
Drawn By: PE	Checked By: JH
Project No.: 190907	Figure No.: 6-12
Scale: 1:13000	Date: 2022-06-01

MKO Planning and Environmental Consultants
 Turn Road, Galway
 Ireland, H91 VW84
 +353 (0)91 733611
 email: info@mkoeireland.ie
 Website: www.mkoeireland.ie

6.6.1.1 Grassland habitats

Grasslands makes up a significant proportion of the habitats within the proposed development site. The EIAR survey area comprises large areas of improved agricultural grassland (GA1) and Dry calcareous and neutral grassland (GS1), with small areas of Wet grassland (GS4) associated with turloughs where they are subject to long periods of groundwater inundation. Detailed botanical quadrat data was recorded on site in the form of relevés taken at specific locations within the site, see Appendix 6-1 and Figure 6-2. The botanical data from all relevés was uploaded to the National Biodiversity Data Centre (NBDC) online habitat classification system ERICA¹³.

6.6.1.1.1 Improved agricultural grassland (GA1)

The areas of improved agricultural grassland (GA1) have primarily been intensively managed for sheep and cattle grazing, and many of the fields surveyed have been reseeded with perennial ryegrass (*Lolium perenne*), see Plate 6-1. These grasslands have been assessed as of local importance (lower value) as they are highly managed. Turbines T1, T3, T4, T5, T6, T7, T8, T11, T13-T14, T15 and T17, T18, T19 and T20, the site compounds, substation and the majority of the internal site access tracks are located within this habitat. The NBDC online habitat classification system ERICA classified the areas of improved agricultural grassland as conforming to the Yorkshire-fog – Perennial Rye-grass grassland (GL2C), Yorkshire-fog – Perennial Rye-grass grassland (GL2C) and in some areas the Annual Meadow-grass – Greater Plantain weed community (WE1E) community. These are species-poor grassland communities with low conservation value.



Plate 6-1: Example of improved agricultural grassland occurring within the vicinity of Turbine no. T4.

6.6.1.1.2 Dry calcareous and neutral grassland (GS1)

Areas of Dry calcareous and neutral grassland (GS1) comprise of a mix of both semi-natural and semi-improved grasslands. Some areas mapped as Dry calcareous and neutral grassland (GS1) have been subject to intensive grazing, primarily sheep and cattle grazing, see Plate 6-2. Turbines nos. T9, T10, part of T12, part of T16, and a number of proposed site access roads occur within this habitat. The calcareous grassland subject to intensive sheep and cattle grazing is dominated by sweet vernal-grass

¹³ Engine for Relevés to Irish Communities Assignment

(*Anthoxanthum odoratum*), meadow fox-tail (*Alopecurus pratensis*), annual meadow-grass (*Poa annua*), red fescue (*Festuca rubra*), Yorkshire fog and some perennial ryegrass, with herbs including yarrow (*Achillea millefolium*), white clover (*Trifolium repens*), common sorrel (*Rumex acetosa*), daisy (*Bellis perennis*), ribwort plantain (*Plantago lanceolata*), creeping buttercup (*Ranunculus repens*) and bulbous buttercup (*Ranunculus bulbosus*) common throughout.



Plate 6-2: Example of improved Dry calcareous and neutral grassland (GS1), although containing many herb species

The areas of Dry calcareous and neutral grassland (GS1) not subject to agricultural improvement also occur in association with patches of scrub and limestone boulders, see Plate 6-3. Turbines no. T9, T10, part of T12, part of T13, part of T16, and a number of proposed site access roads occur within this habitat. This grassland is species rich and of high biodiversity value. The grassland comprises of crested dog's tail (*Cynosurus cristatus*), Yorkshire fog (*Holcus lanatus*), cock's foot grass (*Dactylis glomerata*), rough meadow-grass (*Poa trivialis*) with a rich herb layer comprising mainly of yarrow (*Achillea millefolium*), ribwort plantain (*Plantago lanceolata*), rough hawkbit (*Leontodon hispidus*) and lady's bedstraw (*Galium verum*). Other species typical of this calcareous limestone boulder habitat include mountain everlasting (*Antennaria dioica*), carline thistle (*Carlina vulgaris*), primrose (*Primula vulgaris*), wild thyme (*Thymus polytrichus*), spring sedge (*Carex caryophyllea*), glaucous sedge (*Carex flacca*), bird's foot-trefoil (*Lotus corniculatus*) and cat's-ear (*Hypochaeris radicata*). The bryophyte layer within the grassland include *Ctenidium molluscum*, *Rhytidiadelphus squarrosus*, *Rhytidiadelphus loreus* and *Hylocomium splendens*. The surveys identified a variety of orchid species including early purple orchid (*Orchis mascula*), common spotted orchid (*Dactylorhiza fuchsii* subsp. *Fuchsia*), fragrant orchid (*Gymnadenia conopsea*) and a single individual autumn ladies tresses orchid (*Spiranthes spiralis*) approximately 110m north-west of T9, see Plate 6-5. These species are typical of the Annex I habitat Calcareous grassland (*orchid-rich) [6210] and the site contains an extensive population of early purple orchid (*Orchis mascula*)¹⁴, see Plate 6-4. The grassland also supports a wide diversity of fungi species, see Section 6.6.2.1, with yellow meadow ant (*Lasius flavus*) hills common throughout. Such ant hill features provide a microclimate of well drained soils that are in turn covered by wild thyme and bird's foot-trefoil. Where the grassland occurs in association with scrub habitat, other species typical of this habitat transition occur including, wood-sorrel (*Oxalis acetosella*), bramble (*Rubus fruticosus*), lords and ladies (*Arum maculatum*) and bluebell (*Hyacinthoides non-scripta*).

¹⁴ This is based on the Irish Wildlife Manual (Martin et al., 2019¹⁴) guidance which states that the 6210 grassland habitat "is considered a priority habitat only if it is an important orchid site" [*6210]. O'Neill et al., (2013) states that "if the 6210 grassland has a population of any orchid species other than the relatively common *Dactylorhiza fuchsii* and *Dactylorhiza maculata* it should be considered for the orchid-rich priority¹⁴ habitat *6210".

Using the ERICA classification system the majority of the relevés taken in unimproved semi-natural dry calcareous grasslands (GA1) conformed to the community type ‘Quaking-grass – Wild Thyme grassland’ (GL3A). This community type has a high affinity (92%) with the Annex I Calcareous grassland [6210] Orchid-rich calcareous grassland*¹⁵ (Perrin, 2016a¹⁶). Some areas corresponded to the Crested Dog’s-tail – Red Clover grassland (GL3D) community, which also has an affinity with the Annex I 6210 Orchid-rich calcareous grassland* (20.7%) (Perrin, 2016a).



Plate 6-3: Example of limestone boulders occurring within the Annex I habitat Calcareous grassland [6210*].

¹⁵ [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (*important orchid sites)

¹⁶ Perrin 2016a, Community Synopsis; *Briza media* – *Thymus polytrichus* grassland GL3A, Synopsis version: V1.0, Online, Available at: <https://www.biodiversityireland.ie/wordpress/wp-content/uploads/GL3A.pdf>; Accessed, 19.04.2021



Plate 6-4: Example of the extensive early-purple orchid population occurring within the Calcareous grassland [6210*].



Early purple orchid (*Orchis mascula*)



Fragrant orchid (*Gymnadenia conopsea*)



Common spotted orchid (*Dactylorhiza fuchsii*)



Autumn ladies tresses (*Spiranthes spiralis*)

Plate 6-5: Example of orchid species identified within the survey area

In some areas, ling heather (*Calluna vulgaris*) is frequent. However, these areas still conformed to the 'Quaking-grass – Wild Thyme grassland' (GL3A) community. Some areas dominated by dense bramble and blackthorn scrub also contained dense bracken, likely associated with changes in agricultural management.

6.6.1.2 Scrub (WS1)

Given the extent of low intensity managed seminatural grassland habitat occurring within the survey area, scrub (WS1) habitat occurs in association with much of this grassland habitat, generally as an intimate mosaic, see Plate 6-6. Blackthorn and hawthorn are a constant feature of the semi-natural grassland habitat, see Plate 6-6; where coverage of shrubs did not exceed 25% this was mapped as grassland which corresponded to the Annex I habitat Calcareous grassland (*orchid-rich) [6210]. In some areas, hazel dominated scrub occurs, resulting in a herb rich ground layer dominated by primrose, wood-sorrel (*Oxalis acetosella*), common dog violet (*Viola riviniana*), wild strawberry (*Fragaria vesca*) and some early purple orchids, see Plate 6-7. These areas also comprise of significant mosses cover including *Thamnobryum alopecurum*, *Thuidium tamariscinum* and *Rhytidiadelphus loreus*. No development infrastructure is proposed within areas mapped as scrub in Figures 6-7 – 6-10.

Note, as per Calaciura & Spinelli (2008)¹⁷, “*Scrub and woody vegetation, which develops with the relaxation of management, are also considered part of the 6210 habitat*”. Therefore, where scrub habitat occurs in an intimate mosaic with the Annex I habitat semi-natural dry grasslands and scrubland facies on calcareous substrates [6210], it is assessed under this habitat, see Section 6.6.1.1.2.



Plate 6-6: Example of scattered scrub (background) and hazel dominated scrub (middle ground) throughout the semi-natural grassland on site.

¹⁷ Olmeda C., ŠeffEROVÁ V., Underwood E., Millan L., Gil T. and Naumann S. (compilers). EU Action plan to maintain and restore to favourable conservation status the habitat type 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*FestucoBrometalia*) (*important orchid sites). European Commission Technical Report XXXX-2019



Plate 6-7: Example of herb rich ground layer occurring within hazel dominated scrub

6.6.1.3 Arable land (BC1)

A number of fields within the EIAR Site Boundary have been used for arable crop production, generally oats. Turbine T2 and areas of proposed site access roads are located within this habitat. Among the arable dominated sward, other species recorded included annual meadow grass (*Poa annua*), pineappleweed (*Matricaria discoidea*) and redshank (*Persicaria maculosa*). An example of this habitat is provided in Plate 6-8.



Plate 6-8: Example of arable crop occurring within the EIAR Site Boundary.

6.6.1.4 Turloughs (FL6)

“Turloughs are ephemeral lakes that occupy basins or depressions in limestone areas” (Fossitt, 2000). The lands around the Feacle Lough/Turlough (FL6) are largely improved and species poor, see Plates 6-9 and 6-10. However, areas subject to prolonged water inundation comprise of wet grassland (GS4) with species such as silverweed (*Potentilla anserina*), creeping buttercup (*Ranunculus repens*) dominant and in the wettest areas or where permanent standing water remains, floating sweet-grass (*Glyceria fluitans*) occurs.



Plate 6-9: Feacle Lough, a large Turlough (FL6) located to the southeast of the site

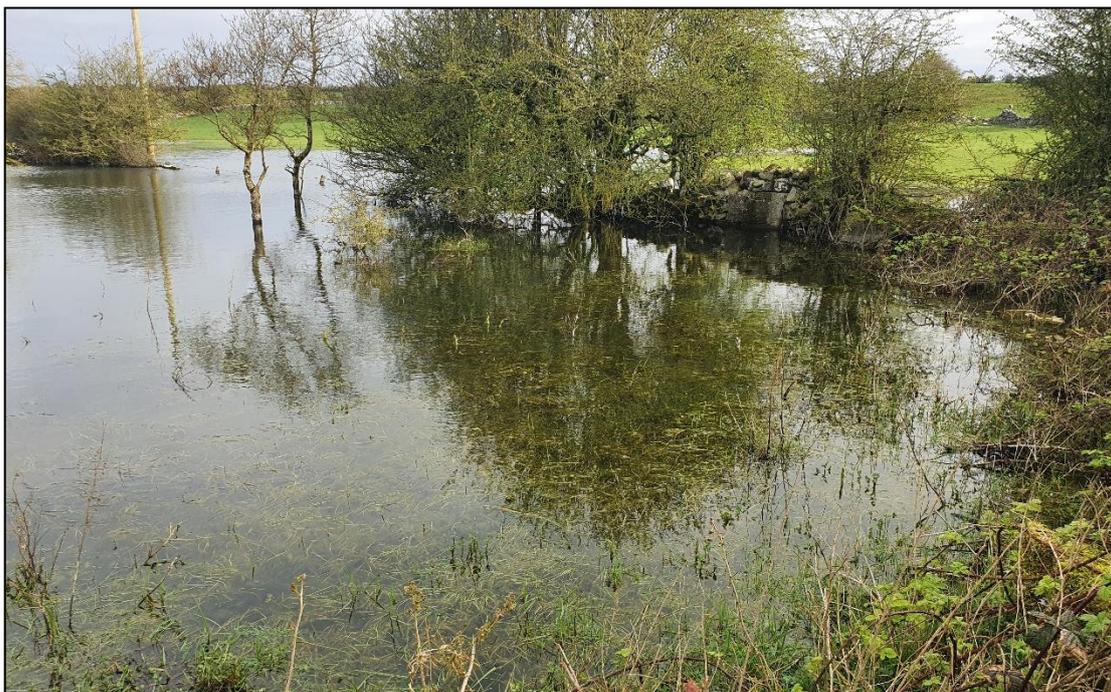


Plate 6-10: Example photo of the northern extent of Feacle Lough/Turlough which dries out in the summer months and is managed as pasture.

6.6.1.5 Stone walls (BL1)

Stone walls (BL1) are the dominant boundary feature within the survey area given the nature of the boulder strewn landscape, see Plate 6-11. In places, these stone walls have become enveloped by bramble and some lined with blackthorn, hawthorn or hazel.



Plate 6-11: Example of stone walls occurring within the survey area.

6.6.1.6 Hedgerows (WL1)

Hedgerows (WL1) occur throughout the survey area, usually in association with stone walls, see Plate 6-12. Hedgerows are largely dominated by blackthorn (*Prunus spinosa*) or hawthorn (*Crataegus monogyna*) and in some areas hazel (*Corylus avellana*). Bramble dominated the understory in places, and on occasion bracken (*Pteridium aquilinum*). Other species occurring within the hedgerow

understorey include lesser celandine (*Ficaria verna*), primrose (*Primula vulgaris*), cleavers (*Galium aparine*) and mosses including *Rhytidiadelphus squarrosus* and *Thuidium tamariscinum* also occur.



Plate 6-12: Example of hedgerow habitat occurring within the survey area dominated by hawthorn.

6.6.1.7 Spoil and bare ground (ED2)

Unbound farm tracks occur in some small areas and were categorised as Spoil and bare ground (ED2), see Plate 6-13. Species recorded comprised mainly of sweet vernal grass (*Anthoxanthum odoratum*), daisy (*Bellis perennis*), dandelion (*Taraxacum officinale* agg.) and colt's-foot (*Tussilago farfara*).



Plate 6-13: Example of existing unbound track categorised as Spoil and bare ground (ED2).

6.6.1.8 Recolonising bare ground (ED3)

Some farm tracks occurring through areas of rough semi-improved grassland contain small areas of recolonising bare ground (ED3), see Plate 6-14. They tend to be recolonised by the abundant species occurring adjacent including red fescue, cocks foot grass, ribwort plantain and creeping thistle initially.



Plate 6-14: Example of existing agricultural access track through rough semi-natural grassland

6.6.1.9 Buildings and Artificial Surfaces (BL3)

There are some farm buildings within the EIAR Site Boundary comprise of agricultural sheds. These were categorised as Buildings and artificial surfaces (BL3), see Plate 6-15.



Plate 6-15: Example of agricultural building categorised as Buildings and artificial surfaces (BL3)

6.6.1.10 Habitats along the Underground Cabling Route

The proposed underground cable route is approximately 12km. The proposed underground cable route will leave the Wind Farm component of the Proposed Development to the north of Turbine no. 18 and 19, initially passing through a short section of existing access track, categorised as Buildings and Artificial Surfaces (BL1), before joining the R363, also categorised as Buildings and artificial surfaces (ED2). The underground cable route runs along the R363, and subsequently for approximately 12km before joining the existing Athlone 110 kV substation. Details of the stream crossings along the underground cable route and the modification works proposed at each existing crossing location is provided in Section 4.3.7.2 Chapter 4 of this EIAR. The stream crossing locations are shown in Figure 4-15, Chapter 4 and watercourse crossing methodology is set out in Section 4.8.7. Instream works are not required at any watercourse crossing along the proposed IPP cable route or Grid Connection route and consequently no impacts on watercourses will occur as part of these works.



Plate 6-16: Example of the existing R363 in which part of the underground cabling is to be located, categorised as Buildings and artificial surfaces (ED2).

A number of watercourses (classified as Eroding/upland rivers (FW1)) occur along the proposed Grid Connection route. No watercourses occur within close proximity to any of the proposed turbine infrastructure. Watercourses were generally fast flowing with a cobble or muddy substrate, see Plate 6-17. The bank side vegetation was dominated by bramble and ivy, with some Hart's-tongue fern (*Asplenium scolopendrium*), nettle and hedge bindweed (*Calystegia sepium*) also a common component throughout.

Additional details of representative watercourses that drain the EIAR survey area boundary along the Grid Connection route is provided in Chapter 9, Water and Hydrology of the EIAR.



Plate 6-17: Example photo of the Ballyglass River (FWI) occurring on the Grid Connection route along the R363

6.6.1.11 Protected Flora

No botanical species listed under the Flora (protection) Order (as amended 2015), listed in the EU Habitats Directive (92/43/EEC), or listed in the Irish Red Data Books were recorded on the site. The species recorded are generally common in the Irish landscape. A single autumn lady's-tresses orchid (*Spiranthes spiralis*), recorded at one location (grid ref: 53.433275, -8.177963) over 60 metres to the west of the proposed access track between Turbine no. T9 and T12 and over 110 metres from the proposed turbine T9 base, is assessed as "near threatened"¹⁸.

6.6.1.12 Invasive species

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

6.6.2 Evaluation of habitats

6.6.2.1 Grassland habitats

As provided in Appendix 6-1 'Botanical study' of this EIAR, the vegetation surveys undertaken between May and September 2020 found that the majority of the relevés taken within areas of semi-natural Dry calcareous and neutral grassland (GS1) confirmed to the IVC community GL3A *Briza*

¹⁸ As per the International Union for the Conservation of Nature (IUCN) and described for Ireland in Nelson, B., Cummins, S., Fay, L., Jeffrey, R., Kelly, S., Kingston, N., Lockhart, N., Marnell, F., Tierney, D. and Wyse Jackson, M. (2019) Checklists of protected and threatened species in Ireland. Irish Wildlife Manuals, No. 116. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

media-Thymus polytrichus. As per the NPWS (2019)¹⁹ Article 17 report, the Calcareous grassland (*orchid-rich) [6210] habitat ‘is comprised of a diverse group of plant communities belonging to the *Bromion-erecti*, including *GL3A Briza media-Thymus polytrichus* grassland (Perrin, 2018)’.

In addition, the assessment took account of the Irish Wildlife Manual (Martin *et al.*, 2019²⁰) guidance which states that the Annex I Calcareous grassland [6210] habitat ‘is considered a priority habitat only if it is an important orchid site’ [*6210]. O’Neill *et al.*, (2013) states that ‘if the 6210 grassland has a population of any orchid species other than the relatively common *Dactylorhiza fuchsii* and *Dactylorhiza maculata* it should be considered for the orchid-rich priority²¹ habitat *6210’. Following botanical surveys undertaken between May and September 2020, a significant population of early-purple orchid (*Orchis mascula*) was recorded within much of the Calcareous grassland [6210*]. Some areas had as many as one per metre squared. Areas that correspond to priority habitat [6210*] (orchid rich sites) have been identified as of *Internationally important* (NRA, 2009). This is due to the fact that these areas contain extensive areas of the habitat types listed in Annex I of the Habitats Directive (NRA, 2009).

Calcareous grassland that was identified as corresponding to the non-priority variant [6210] i.e. an absence of orchid species or presence of *Dactylorhiza fuchsia* only, have been evaluated as of *National importance*. This is due to the extensive areas of this habitat and the fact that it occurs as an intimate mosaic with the priority habitat [6210*]. Although some areas of the Annex I Calcareous grassland [6210] habitat did not always contain the required diversity of typical plant assemblages in all areas, largely due to intensifying grazing regimes or alterations/abandonment in agricultural management or the presence of negative indicator species, these areas were assessed as still conforming to the Annex I habitat although in bad condition.

6.6.2.2 Eroding/upland rivers (FW1) and associated aquatic habitats and related species

The only watercourses occurring within the survey area are those occurring along the Grid Connection route i.e. tributaries of the Ballyglass and Cross Rivers. These watercourses i.e. small streams, have been assigned Local importance (Higher Value) as they are of high biodiversity value in a local context and connect to downstream waterbodies in the local area.

6.6.2.3 Turloughs

Turloughs “are virtually unique to Ireland and their greatest concentration is in counties Clare, Galway and Roscommon” (Fossitt, 2000). Turloughs are also assigned priority status under the Habitats Directive (NRA, 2009) and have therefore been assessed as of *National importance*.

6.6.2.4 Scrub (WS1)

Scrub habitat within the site is largely dominated by patches of blackthorn and hawthorn, although areas dominated by hazel or gorse scrub also occur throughout the EIAR survey area. This habitat is of local importance to local wildlife (NRA, 2009). Where the habitat occurs in an intimate mosaic with the Annex I habitat semi-natural dry grasslands and scrubland facies on calcareous substrates [6210], it is assessed under this habitat (Calaciura & Spinelli, 2008). Where scrub occurs outside of this Annex I grassland habitat, it has been assigned as of local importance (higher value) as, although of high biodiversity value locally, it is common and widespread in the wider area.

¹⁹ NPWS (2019). *The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O’Neill*

²⁰ Martin, J.R., O’Neill, F.H. & Daly, O.H. (2018) *The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats. Irish Wildlife Manuals, No. 102. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland*

²¹ Priority habitats are indicated using an *.

6.6.2.5 Arable land (BC1)

The habitat has been assessed as of Local Importance (Lower Value) as it is largely associated with highly modified agricultural lands of low biodiversity value.

6.6.2.6 Spoil and bare ground (ED2), Recolonising bare ground (ED3) & Buildings and artificial surfaces (BL3)

These habitats are common and widespread in the wider area. The habitats have been assessed as of Local Importance (Lower value) as they are largely associated with artificial site access tracks and are of low biodiversity value.

6.6.2.7 Hedgerow (WL1) & Stone walls (BL1)

Hedgerows have been assessed as of Local Importance (Higher Value) as they provide connectivity to the wider landscape and provide supporting habitat for a wide variety of faunal species. Stone walls, often occurring in association with hedgerows within the site have been assessed as of local importance (higher value) as they provide connectivity to the wider landscape and provide supporting habitat for a wide variety of faunal species.

6.6.3 Fauna in the Existing Environment

The following subsections provide a breakdown of the species recorded during the site visits and assessments.

6.6.3.1 Badger

Two badger setts were recorded within the EIAR Site Boundary, both comprising of a single entrance. These were classified as *outlier* setts (as per Smal, (1995)²²). One of the setts was confirmed to be in occasional use by badgers during monitoring via remote camera traps, during which a single individual was identified entering the sett on one occasion in September 2020. The location of the badger setts are provided in Confidential Appendix 6-6²³. One of the setts is located in close proximity to the proposed site access road leading to T4 (see Plate 6-18). Therefore, following the deployment of a camera trap at the location and subsequent evidence of badger usage of the sett, the proposed site access road was altered during the iterative design process to avoid any potential for unnecessary destruction/disturbance to the feature.

²² Smal, C. (1995) *The Badger and Habitat Survey of Ireland. Unpublished Report to the Department of Agriculture and the National Parks & Wildlife Service.*

²³ Following standard best practice, the location of breeding or resting places of protected species should be provided as a confidential appendix for review by the competent authority and not made available to the public in order to avoid potential for persecution.



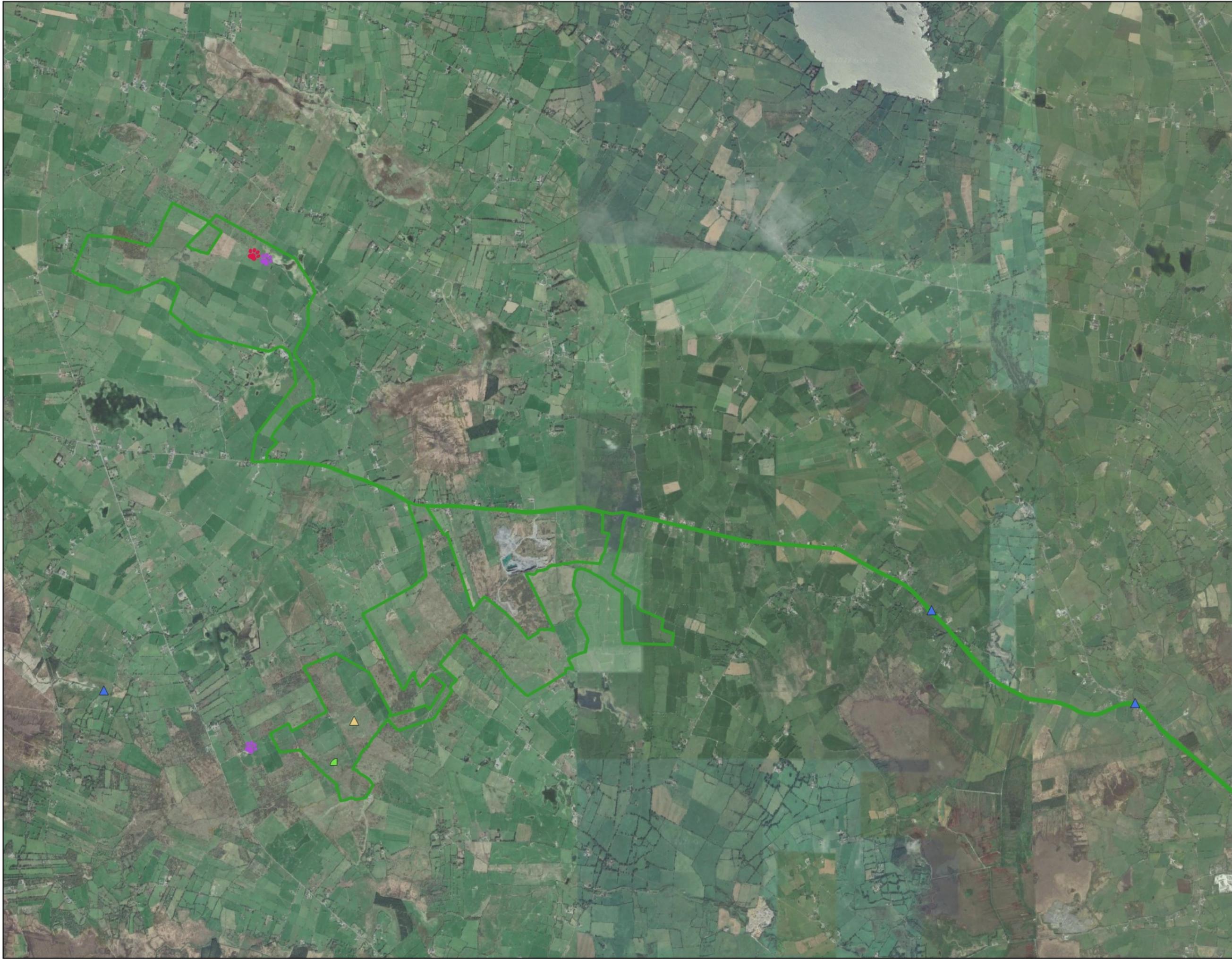
Plate 6-18: Example of actively used single entrance badger sett occurring within the survey area.

6.6.3.2 Otter

No otter signs were recorded within close proximity to the proposed wind turbines, hardstands and access roads. This is due to the absence of watercourses in relation to these features within the EIA/R Site Boundary. Watercourses do occur however at a number of locations along the proposed Grid Connection route. As a result, these watercourses were assessed for signs of otter on both the 24th September 2020, 31st March 2021 and during September 2021. A single otter spraint was recorded during a dedicated survey of the Cross River (grid reference: 53.4490754 -8.0864511), see Figure 6-13 and Plate 6-19. An additional otter spraint was subsequently recorded underneath the bridge (ITM 585640,743488) during the aquatic baseline surveys carried out in September 2021. The watercourses were assessed as providing suitable commuting and foraging habitat for the species and it suggests that otters occur within these watercourses downstream of the Grid Connection route, at least on occasion.



Plate 6-19: Example of otter spraint located along the Cross River, downstream of the Grid Connection route.



Map Legend

- ▭ EIA Site Boundary
- ▲ Fox Scat
- Irish hare (direct observation)
- ▲ Otter spraint
- 🐾 Badger tracks
- 🐾 Fox tracks

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Mammal Records

Project Title:
Seven Hills Wind Farm, Co.
Roscommon

Drawn By	Checked By
PE	JH
Project No.	Figure No.
190907	6-13
Scale	Date
1:35000	2022-06-01

MKO
 Planning and
 Environmental
 Consultants
 Turn Road, Galway
 Ireland, H91 VW84
 +353 (0)91 733611
 email: fo@mkoreland.ie
 Website: www.mkoreland.ie

6.6.3.3 Bats

Bat surveys undertaken in 2020, in accordance with Scottish Natural Heritage Guidance (SNH 2019), form the core dataset for the assessment of effects on bats. Bat surveys included roost surveys, manual transect surveys and ground-level static surveys.

Roost surveys 2020

Following the search for roosts in 2020, no structures containing potential suitable bat roost features were identified within 200m plus the rotor radius (81m) of the Proposed Development footprint. Dedicated bat surveys (see Bat Report provided as Appendix 6-2) included a structure which was identified as a roost. This structure is located approximately 100m outside the main EIAR Survey Area, approximately 550m away from the nearest proposed turbine, and is therefore not within the likely zone of influence. However, the structure was nevertheless subjected to a roost assessment in 2020; this comprised a detailed external and internal inspection of the building for evidence of bat roost and dusk and dawn emergence/re-entry surveys (see Appendix 6-2 for detailed methodology). The building was confirmed as a roost for both common and soprano pipistrelle during the surveys (see Section 4.4 of Appendix 6-2).

The site was checked for potential tree roosts but no trees with significant roosting features were identified within the site. Trees may have increased or decreased probability of hosting roosting bats in certain circumstances i.e. Having large broadleaf trees with cavities or other damage such as rot or loose bark increased probability whereas, Conifer plantations and young trees with little – no damage have a decreased probability of hosting bats (Kelleher and Marnell, 2006). The surrounding habitats were assessed as largely unsuitable for roosting bats.

Manual transects 2020

Manual transects were undertaken in Spring, Summer and Autumn 2020. Bat activity was recorded on all surveys. In general, Soprano pipistrelle (n=897) was recorded most frequently, followed by Common pipistrelle (n=744) and Leisler's bat (n=108). Instances of Myotis spp. (n=29), Nathusius' pipistrelle (n=12) and Brown long-eared bat (n=4) were less frequent. However, species composition and activity levels varied significantly between surveys. Transect survey results were calculated as bat passes per km surveyed (to account for differences in survey effort). Figures 4-1 – 4-3, Section 4.5 'Manual Transects' of the accompanying 'Bat Report', provided in Appendix 6-2 of the EIAR, present the spatial distribution of bat activity across the surveys. Bat activity was concentrated along hedgerows, scrub, walls and linear (road/track) habitats.

Figures 4-2 and 4-3 of the Bat Report (Appendix 6-2) also show bat activity which was concentrated at the derelict structure described above. Surveyors were positioned at the derelict structure, for 1.5 hours during the dusk surveys and for the duration of the dawn surveys in Summer and Autumn, to look for bats exiting and re-entering the building. Bats were observed and recorded commuting between the building and treelines to surrounding areas.

Ground-level Static Surveys 2020

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

In total, 64,082 bat passes were recorded across all deployments. In general, Common pipistrelle (n=43,072) occurred most frequently, followed by Leisler's bat (n=10,360), Soprano pipistrelle (n=5,203) and Myotis spp. (n=4,284). Instances of Brown long-eared bat (n=1,043) were significantly less. Nathusius' pipistrelle (n=120) was rare.

Bat activity was calculated as total bat passes per hour (bp/h) per season to account for any bias in survey effort, resulting from varying night lengths between seasons. Plate 4-9 and Table 4-4 of the Bat Report (Appendix 6-2 of the EIAR) presents these results for each species. Bat activity was dominated by Common pipistrelle across all seasons. In addition, Leisler's bat occurred frequently in Summer. Instances of Soprano pipistrelle and *Myotis* spp. were less frequent. Brown long-eared bat and Nathusius' pipistrelle were relatively rare.

The Nightly Pass Rate (i.e. total bat passes per hour, per night) was used to determine typical bat activity at the Proposed Development site. Activity is often variable between survey nights. Therefore, the Median Nightly Pass Rate was used as the most appropriate measure of bat activity (Lintott & Mathews, 2018). Results for each species per detector can be found in Sections 4.6 and 4.7 of the Bat Report, provided in Appendix 6-2 of the EIAR.

Myotis spp. activity at D13 during the Spring period was significantly higher than all other deployments. *Myotis* spp. was also predominant at D11 and D14 in Spring. Common pipistrelle was predominant at all other detectors during the Spring survey period. Summer bat activity at all detectors was dominated by Common pipistrelle or Leisler's bat. Autumn activity was dominated by Common pipistrelle at the majority of detector locations. In addition, activity at D02 and D07 in Autumn was significantly higher than all other detectors during the same period.

Bat activity levels were objectively assessed against a reference dataset using Ecobat. Table 4-6 presents the results of Ecobat analysis for each species per season on a site-level. Appendix 6 of the Bat Report (Appendix 6-2 of this EIAR) provides these results per detector. Median activity levels for Leisler's bat and Common pipistrelle peaked at Moderate to High for at least one season. Median activity levels for Soprano pipistrelle and *Myotis* spp. peaked at Moderate for at least one season. Median activity levels for Brown long-eared bat peaked with Low to Moderate activity for at least one season. Nathusius' pipistrelle recorded Low median bat activity across all seasons. Maximum activity levels peaked with High activity for all species for at least one season.

Surveys at Height

Simultaneous surveying at ground level and at height was undertaken using an SM3 static detector. One U1 microphone was attached at height (Approx. 80m) to the meteorological mast while another U1 microphone was placed 2m from ground level.

In 2020, 32 nights of simultaneous bat monitoring at ground level and at height was achieved. In total, 107 bat passes were recorded with bat activity significantly higher at ground level (75%) compared to activity at height (25%) (Plate 4-11 of the Bat Report). Leisler's bat (n=24) and Soprano pipistrelle (n=3) were recorded at height. Leisler's bat (n=34), Soprano pipistrelle (n=18), Brown long-eared bat (n=12), Common pipistrelle (n=8), *Myotis* spp. (n=5) and Nathusius' pipistrelle (n=3) were recorded at ground level. Plate 4-12 of the Bat Report (Appendix 6-2 of this EIAR) shows species composition per night.

6.6.3.3.2 Reptiles and Amphibians

Common frog (*Rana temporaria*) was recorded within the survey area. The species is likely to breed in small wetland areas and turloughs within the EIAR survey area. Common lizard (*Zootoca vivipara*) and smooth newt (*Lissotriton vulgaris*), while not recorded during the site visits, are likely to occur within the survey area. The Proposed Development will not result in a significant loss of suitable habitat for reptiles and amphibians. It is considered that suitable habitat is extremely widespread in the survey area and beyond.

6.6.3.3.3 Fisheries and Aquatic Fauna

Kick Sampling

The small watercourses that occur along the Grid Connection route were subject to biological evaluation and assessment through kick sampling. Full details of the results of these surveys are provided in Appendix 6-3. A map of the kick sample locations is provided in Figure 6-2.

The survey included a general habitat assessment and biological water quality assessment at watercourses along the underground cabling route. The water quality, as per Q-value (Quality Rating System)²⁴, is fully described in Appendix 6-3. One of the four specified Sampling Stations could not be sampled in 2021, due to water levels being too high at the time of the survey. The three sample locations that could be assessed were categorised as being a Q value of Q3 'Moderately polluted'.

Fisheries Surveys

The watercourses along the Grid Connection route were assessed during the multidisciplinary walkover surveys to have some potential to supporting resident salmonids, European eel, lamprey or white-clawed crayfish. However, the larger downstream watercourses within the lower catchment are likely to support fish species identified in the desk study, see Section 6.5.1.8.

Following a scoping response by Inland Fisheries Ireland (IFI), dedicated electrofishing surveys and aquatic habitat assessments were carried out in accordance best practice guidance at all freshwater watercourses which could be affected directly or indirectly by the proposed Wind Farm, namely those crossed by the Grid Connection route (GCR). A total of $n=6$ sites were selected for detailed aquatic assessment, 2 on the Ballyglass River (see Appendix 6-4, Table 2-1, Figure 2-1). Surveys carried out at each of the sites included a fisheries assessment (electro-fishing on riverine sites) with white-clawed crayfish (sweep netting & hand searching) surveys also undertaken at each site, in addition to macrophyte and aquatic bryophyte surveys. Along with species specific surveys efforts also focused on both instream and riparian habitats approx. 150m upstream and 150m downstream of each sampling point. This helped to evaluate species and habitats of ecological value in the vicinity of each site.

For detailed survey methodology, please refer to accompanying fisheries assessment report in Appendix A of accompanying Aquatic Baseline Report, provided as Appendix 6-4.

Of the 6 sites surveyed 3 were evaluated as being of **local importance (higher value)**. Primarily, this evaluation was due to the presence of salmonids, Annex II *Lampetra* sp and The Annex I habitat 'Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation and aquatic mosses [3260]. The higher value sites were present on Barr's Drain (A2) (*Lampetra* sp. recorded via electro-fishing), Cross River (A4) (Atlantic salmon and Annex I 'floating river vegetation [3260]' present) and lower reaches of the Ballyglass River (B2) (*Lampetra* sp. recorded via electro-fishing).

The remaining survey sites on the Ratawragh Stream (A1), unnamed drainage channel (A3) and Ballyglass River (B1) were evaluated as **local importance (lower value)** in terms of their aquatic ecology given the absence of aquatic species or habitat of high conservation value.

Atlantic salmon, brown trout & stone loach were all recorded from the Cross River during electro-fishing surveys carried out as part of the assessment. Annex I 'floating river vegetation [3260]' present. Lamprey were found on the Barr's Drain and Ballyglass River. No European eel were recorded during the surveys.

²⁴ Toner, P., Bowman, J., Clabby, K., Lucey, J., McGarrigle, M., Concannon, C., & MacGarthaigh, M. (2005). *Water quality in Ireland. Environmental Protection Agency, Co. Wexford, Ireland.*

6.6.3.3.4 Marsh Fritillary

Despite dedicated marsh fritillary walked transects (for adults on the 8th and 22nd May 2020) and larval web surveys (on the 4th & 24th September 2020 and 30th March 2021), no evidence of this species was recorded. Previous field survey work had identified suitable habitat for the species and there is a single NBDC²⁵ record of the species within the survey area. The areas of grassland identified as providing supporting habitat i.e. suitable abundance of devils-bit scabious (*Succisa pratensis*) were searched and assessed. The Calcareous grassland (GS1) in which Turbines T10, T11 & T17 are located did contain some small areas of devils-bit scabious. These areas were subject to targeted larval web surveys and no marsh fritillary were recorded. Areas of more extensive, optimal habitat for the species have been avoided as far as possible, with minimal proposed infrastructure located within these areas.

During the larval web searches of areas of suitable marsh fritillary habitat, habitat condition assessments were undertaken during larval web searches within areas of suitable habitat for the species. As described in Section 6.4.3.3.3, habitat suitability assessments involved an assessment of the vegetation characteristics at a requisite number of stops within the area of suitable habitat. Records of vegetation height, abundance of devil's bit scabious, presence of structured vegetation, low invading scrub and stock grazing were noted within the relevant recording sheets. This followed methods set out in National Biodiversity Data Centre (NBDC²⁶) best practice guidance. Only areas identified as providing suitable marsh fritillary supporting habitat i.e. containing sufficient abundance of devils-bit scabious, were subject to the condition assessment. An example of suitable marsh fritillary habitat occurring within the site is provided in Plate 6-20. All areas of more extensive, optimal habitat for the species have been avoided, with no proposed infrastructure located within these areas.



Plate 6-20: Suitable supporting marsh fritillary habitat within the southwest part of the Southern Cluster.

²⁵ 2011 record

²⁶ NBDC, 2019, *Habitat Condition Assessment for Marsh Fritillary*, Online, Available at: <http://www.biodiversityireland.ie/wordpress/wp-content/uploads/Marsh-Fritillary-Habitat-Condition-Form.pdf>, Accessed, 20 March 2020

6.6.3.3.5 Other species

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

The site of the Proposed Development was not suitable for other Annex IV species for which strict protection under the Regulations i.e. natterjack toad, Kerry slug, cetaceans or marine turtles, and no information suggesting these species are present in the vicinity of the site were identified during the desk study or site surveys. The presence of bats and otter within the site has resulted in these species groups being classified as Key Ecological Receptors (see Section 6.6.4 below). Requirements for mitigation in relation for these species are set out in Section 6.7. The requirement for strict protection for these species under the Birds and Natural Habitats Regulations (2011) has therefore been fully complied with.

The semi-natural grasslands on site are likely to provide supporting habitat for a wide variety pollinator species. Incidental records of invertebrates were recorded during the walkover surveys of the site. In addition to the aquatic invertebrates identified during kick samples of the watercourses on site, the following include the species commonly recorded within the survey area:

- > Nursery web spider (*Pisaura mirabilis*)
- > Yellow meadow ant (*Lasius flavus*)
- > Brimstone (*Gonepteryx rhamni*)
- > Wall Brown (*Lasiommata megera*)
- > Small tortoise shell (*Aglais urticae*)
- > Dung fly (*Scatophaga stercoraia*)
- > Heath Snail (*Helicella itala*)
- > Fox moth (*Macrothylacia rubi*)
- > Drinker moth (*Euthrix potatoria*)
- > Peacock butterfly (*Inachis io*)
- > Red admiral (*Vanessa atalanta*)
- > Meadow brown (*Maniola jurtina*)
- > Speckled wood butterfly (*Pararge aegeria*)
- > Green veined white (*Pieris napi*)
- > Common blue damselfly (*Polyommatus icarus*)
- > Small tortoiseshell butterfly (*Aglais urticae*)
- > Small Copper (*Lycaena phlaeas*)
- > Buff-tailed bumblebee (*Bombus terrestris*)
- > Large Red Tailed Bumble Bee (*Bombus (Melanobombus) lapidarius*)
- > Garden spider (*Araneus diadematus*)
- > Crane fly (*Tipulidae sp*)
- > Field grasshopper (*Chorthippus brunneus*)
- > Meadow grasshopper (*Chorthippus parallelus*)

The semi-natural dry grasslands also supports a diverse fungi species including apricot club (*Clavulinopsis luteoalba*), earthtongue (*Geoglossum cookeanum*), and several species of waxcap which are typical of this habitat, see Plate 6-21.



Plate 6-21: Example of apricot club (*Clavulinopsis luteoalba*) and earthtongue (*Geoglossum cookeanum*) occurring within the calcareous grassland.

6.6.4 Identification of Key Ecological Receptors

Table 6-13 lists all identified receptors and assigns them an ecological importance in accordance with the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009). This table also provides the rationale for this determination and identifies the habitats that are Key Ecological Receptors. These ecological receptors are considered in Section 6.7 of this report and mitigation/ measures will be incorporated into the Proposed Development where required, to avoid potential significant impacts on the features.

Table 6-13: Key Ecological Receptors identified during the assessment

Ecological feature or species	Reason for inclusion as a KER	KER
Designated sites	<p>Nationally Designated Sites</p> <p>The following Nationally designated sites are located downstream of the Proposed Development and have been identified as being within the likely Zone of Impact as it is located Downstream of Grid Connection route:</p> <ul style="list-style-type: none"> ➤ River Shannon Callows NHA ➤ Suck River Callows NHA [000222] ➤ Castle Ffrench East Bog NHA 001244] ➤ Annaghbeg Bog NHA [002344] ➤ Ballygar Bog NHA ➤ Castle Ffrench West Bog NHA [000280] ➤ Aghrim Bog NHA [001227] ➤ Killure Bog NHA ➤ Carrickynaghtan Bog NHA ➤ Crit Island West NHA ➤ Kilmore Bog NHA ➤ Feacle Turlough pNHA [001634] ➤ Four Roads Turlough pNHA [001637] (also designated as an SAC and SPA) <p>These designated sites have been assessed as of National importance.</p>	Yes
	<p>European Designated Sites</p> <p>As per EPA draft Guidance 2017, “a biodiversity section of an EIAR, should not repeat the detailed assessment of potential effects on European sites contained in a Natura Impact Statement” but should “incorporate</p>	Yes

Ecological feature or species	Reason for inclusion as a KER	KER
	<p>their key findings as available and appropriate”. European Sites within the Likely Zone of Impact are therefore identified as KERs here.</p> <p>The following Special Areas of Conservation are identified in the AA Screening as being within the Likely Zone of Impact and are assessed fully in the NIS that accompanies this application:</p> <ul style="list-style-type: none"> ➤ Ballynamona Bog and Corkip Lough SAC [002339] ➤ Killeglan Grassland SAC [002214] ➤ Four Roads Turlough SAC (001637) (also designated as a pNHA) ➤ River Shannon Callows SAC [000216] ➤ Lough Croan Turlough SPA (004139) ➤ River Suck Callows SPA [004097] ➤ Four Roads Turlough SPA (004140) ➤ Lough Ree SPA [004064] ➤ Middle Shannon Callows SPA [004096] <p>These sites are assigned International importance and included as a KER as there is potential for indirect effects on them via water pollution.</p> <p>Note: SPAs within the Likely Zone of Impact are considered in Chapter 7, Ornithology and in the NIS.</p>	
Eroding/upland rivers (FW1) and associated aquatic habitats and related species	<p>There are no watercourses occurring in the area of the proposed turbines and associated infrastructure. The only watercourses occurring within the survey area are those occurring along the Grid Connection route i.e. tributaries of the Ballyglass and Cross Rivers (see Chapter 9 Hydrology and Hydrogeology”).</p> <p>These watercourses i.e. small streams and drainage ditches, have been assigned Local importance (Higher Value) as they are of high biodiversity value in a local context and connect to downstream waterbodies in the local area. Therefore, in the absence of appropriate mitigation and design, taking a precautionary approach; potential for indirect effect on these watercourses has been identified. Eroding/upland rivers (FW1) and associated aquatic habitats and related species have therefore been identified as a KER for further assessment.</p>	Yes
Turloughs	<p>Turloughs “are virtually unique to Ireland” (Fossitt, 2000). Turloughs are also assigned priority status under the Habitats Directive (NRA, 2009) and have therefore been assessed as of National importance. As described in Chapter 9 ‘Water’ of the EIAR, no potential for impact on these features in the wider area has been identified. The closest turlough to a proposed turbine is Gortaphuill turlough, which is located 50m northeast of proposed Turbine T4. Section 9.4, Chapter 9 identifies potential for significant indirect effects on nearby turloughs in the absence of mitigation.</p>	Yes
Improved agricultural grassland (GS1)	<p>Much of the Proposed Development infrastructure is located within Improved agricultural grassland (GS1). This is a highly modified habitat with a low biodiversity value. This is classified as Local Importance (lower value). For these reasons, this habitat has not been identified as a KER.</p>	No
Dry calcareous and neutral grassland (GS1) including scrub mosaic	<p>Where this habitat conforms to the Annex I habitat Semi-natural dry grasslands (<i>FestucoBrometalia</i>) [6210], it has been assigned National Importance as the areas of grassland conform to EU Habitats Directive Annex I habitat and is of high biodiversity in a county and national context. Where the habitat conforms to the semi-natural dry grasslands and</p>	Yes

Ecological feature or species	Reason for inclusion as a KER	KER
	<p>scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (*important orchid sites), it has been assigned National importance.</p> <p>Where scrub habitat occurs in an intimate mosaic with the Annex I habitat semi-natural dry grasslands and scrubland facies on calcareous substrates [6210], it has been assessed under this habitat (Calaciura & Spinelli. 2008). Where scrub occurs outside of this Annex I grassland habitat, this has been assessed separately (see below).</p> <p>The footprint of the Proposed Development has the potential to result in direct and indirect effects on this receptor, and it is included as a KER for further assessment.</p>	
Scrub (WS1)	<p>This habitat within the site is largely dominated by patches of blackthorn and hawthorn, although areas dominated by hazel or gorse scrub also occur throughout the EIA survey area. This habitat is of local importance to local wildlife (NRA, 2009).</p> <p>Where scrub occurs outside of Annex I grassland habitat, it has been assigned as of Local Importance (higher value) as, although of high biodiversity value locally, it is common and widespread in the wider area. It is therefore not assessed as a KER where it occurs outside areas of seminatural grassland [6210] habitat.</p>	No
Arable land (BC1)	<p>The habitat has been assessed as of Local Importance (lower value) as it is largely associated with highly modified agricultural lands of low biodiversity value. For this reason, it has not been identified for further assessment and is not a KER.</p>	No
Spoil and bare ground (ED2), Recolonising bare ground (ED3) & Buildings and artificial surfaces (BL3)	<p>These habitats are common and widespread in the wider area. The habitats have been assessed as of Local Importance (lower value) as they are largely associated with artificial site access tracks and are of low biodiversity value. For this reason, they have not been identified for further assessment and are not a KER.</p>	No
Hedgerow (WL1) & Stone walls (BL1)	<p>Hedgerows have been assessed as of Local Importance (higher value) as they provide connectivity to the wider landscape and provide supporting habitat for a wide variety of faunal species. In order to facilitate some of the Proposed Development footprint and maintain a separation in distance between the turbine blades and hedgerow features (likely to be used by commuting and foraging bat species locally), there will be some loss of hedgerow habitat within the application site. For this reason, hedgerows have been identified for further assessment as a KER.</p> <p>Stone walls, often occurring in association with hedgerows within the site have been assessed as of Local Importance (higher value) as they provide connectivity to the wider landscape and provide supporting habitat for a wide variety of faunal species. In order to facilitate some of the Proposed Development footprint there will be some loss of hedgerow habitat within the application site. For this reason, stone walls have been identified for further assessment as a KER in combination with hedgerows.</p>	Yes
Badger	<p>Badger as an ecological receptor has been assigned Local Importance (Higher value) on the basis that the habitats within and adjacent to the survey area are likely to be utilised by a locally occurring badger population of Local Importance. The Proposed Development has been</p>	Yes

Ecological feature or species	Reason for inclusion as a KER	KER
	altered to avoid potential for direct impacts on the species as a result of the development infrastructure. Given that the species is known to inhabit the area, potential for direct and indirect impacts on badger therefore considered further in this assessment and the species has been included as a KER for further assessment.	
Otter	A single record of otter was recorded within the EIAR survey area boundary, beneath a culvert on the R363 between the proposed windfarm and the substation. This was recorded during targeted otter surveys of the site. Based on the low number of otter records within the survey area and the absence of watercourses in close proximity to any of the proposed infrastructure (with the exception of the Grid Connection), otter has been assessed as of Local Importance (higher value) . This is also because the species is listed in Annex II and IV of the EU Habitats Directive. No evidence of a more ecologically important population was recorded during any of the site surveys undertaken. The Proposed Development has the potential to result in indirect effects on the receptor (as a result of deterioration in water quality i.e. supporting habitat, or disturbance/displacement during construction of the Grid Connection route only) and it is therefore included as a KER and requires further assessment following a precautionary approach.	Yes
Bats	The habitats within and surrounding the Proposed Development site are likely to be utilised by a bat population of Local Importance (higher value) . All bat species in Ireland are protected under both national legislation – (Wildlife Act, 1976, as amended and European legislation – (Habitats Directive (92/43/EEC). Bats are likely to forage and commute within the vicinity of the Proposed Development. No potential bat roosting features were identified within the development footprint; a bat roost of Local Importance was identified within the wider Survey Area. The Proposed Development has the potential to result in direct and indirect effects on the receptor. Therefore, bats are included as a KER for further assessment.	Yes
Reptiles and Amphibians	It is considered that the Proposed Development will not result in a significant loss of suitable habitat for reptiles and amphibians. No evidence of populations of amphibians being significant at more than a local level was recorded. No likely significant effects on these species are anticipated and therefore further survey/ assessment was not deemed necessary. Based on the low number of amphibian records for the site and the highly afforested nature of parts of the survey area, amphibians and reptiles have been assessed as of Local Importance (lower value) .	No
Marsh fritillary	Due to the absence of the species occurring within the site during dedicated survey work, and the avoidance of optimal habitat for the species within the application site, no potential for significant effect on this species exists. The species is therefore not considered as a KER for further assessment.	No
Fisheries and Aquatic Fauna	The aquatic species that are associated with the watercourses occurring along of the Grid Connection route have been assigned Local Importance (Higher Value) as they have a high biodiversity value in the local context. The downstream watercourses and fauna within them have been assigned as of Local Importance (Higher Value) due to the known populations of salmonid, trout, lamprey species, white clawed crayfish, European eel, aquatic invertebrates and other aquatic species. Potential for indirect effect on these features as a result of impacts on water quality associated with the installation of the Grid Connection only. Fish and other aquatic species are	Yes

Ecological feature or species	Reason for inclusion as a KER	KER
	therefore included as a KER for further assessment along with Upland eroding rivers described above.	
Invasive species	No invasive species were recorded within the application site, and there is therefore no potential for significant effect. Invasive species are not identified as a KER.	No
Additional fauna (e.g. Irish hare, fox etc).	The recorded evidence suggests that the survey area is not utilised by populations of higher than local significance, and no potential for significantly effects have been identified at the population level For this reason, other faunal species are not considered further in this EIAR. Significant effects are not anticipated.	No

6.7 Ecological Impact Assessment

6.7.1 Do-Nothing Effect

If the Proposed Development were not to proceed, the majority of the lands within the site would continue to be managed as improved and seminatural agricultural grassland and associated grazing. The other habitats identified within the EIAR Site Boundary, including stone walls, scrub and wetlands, would likely remain in a similar condition. In some areas of seminatural grassland where scrub succession is establishing, this scrub is likely to develop and in time, this may undergo succession to small areas of woodland. The general biodiversity on the site, as described in this chapter, would likely remain similar to its current state as activity levels and land use would not change significantly.

6.7.2 Effects on Designated Sites

None of the elements of the Proposed Development are located within the boundaries of any Nationally or European designated sites. There will be no direct effects on any designated site as a result of the construction, operation and decommissioning the Proposed Development.

Eleven nationally designated sites have been identified as being within the zone of influence due to potential for indirect impacts and have therefore been assigned as KERs. These are:

- > Suck River Callows NHA [000222] (also designated as River Suck Callows SPA)
- > Castle Ffrench East Bog NHA 001244]
- > Annaghbeg Bog NHA [002344]
- > Ballygar Bog NHA
- > Castle Ffrench West Bog NHA [000280]
- > Aughrim Bog NHA [001227]
- > Killure Bog NHA
- > Carrickynaghtan Bog NHA
- > Crit Island West NHA
- > Kilmore Bog NHA
- > River Shannon Callows pNHA (also designated as an SAC and as Middle Shannon Callows SPA)
- > Feacle Turlough pNHA [001634]
- > Four Roads Turlough pNHA [001637] (also designated as an SAC and SPA)

Nationally designated sites that are also designated as European Sites have been assessed as those designations within the Appropriate Assessment Screening Report and NIS, with the relevant conclusions are recorded and referenced in this chapter.

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

As per the aforementioned EPA draft Guidance (2017), “a biodiversity section of an EIAR, should not repeat the detailed assessment of potential effects on European sites contained in a Natura Impact Statement” but should “incorporate their key findings as available and appropriate”. This section provides a summary of the key assessment findings with regard to Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

The Screening for Appropriate Assessment concluded as follows:

Following an examination, analysis and evaluation of the relevant data and information set out within this Screening Report, it cannot be excluded beyond reasonable scientific doubt, in view of best scientific knowledge, on the basis of objective information and in light of the conservation objectives of the relevant European sites, that the Proposed Development, individually or in combination with other plans and projects, would be likely to have a significant effect on the following sites:

- Ballynamona Bog and Corkip Lough SAC [002339]
- Killeglan Grassland SAC [002214]
- Four Roads Turlough SAC [001637]
- River Shannon Callows SAC [000216]
- Lough Croan Turlough SPA [004139]
- River Suck Callows SPA [004097]
- Four Roads Turlough SPA [004140]
- Lough Ree SPA [004064]
- Middle Shannon Callows SPA [004096]

As a result, an Appropriate Assessment is required, and a NIS has been prepared in respect of the Proposed Development in order to assess whether the Proposed Development will adversely impact the integrity of these European Sites’.

The findings presented in the NIS are that:

‘All identified potential pathways for impact are robustly prevented through the use of avoidance, appropriate design and mitigation measures as set out within this report and its appendices. The measures ensure that the construction and operation of the Proposed Development does not adversely affect the integrity of European sites.

Therefore, it can be objectively concluded, following an examination, analysis and evaluation of the relevant information, including in particular the nature of predicted impacts from the Proposed Development, and with the implementation of mitigation measures proposed, that the Proposed Development, individually or in combination with other plans or projects, will not adversely affect the integrity of any European Site and there is no reasonable scientific doubt in relation to this conclusion’.

6.7.3 Likely Significant Effects During Construction Phase

6.7.3.1 Effects on Habitats During Construction

Table 6-14 provides details of the extent of the recorded habitats on the site, the extent of the habitat that will be lost to facilitate the Proposed Development.

Table 6-14: Habitats occurring within the EIAR survey area boundary.

Habitat		Total Area (Ha) within the EIAR Boundary	Area (Ha) to be lost to proposed development footprint	% of total to be lost	KER?
Dry Calcareous grassland (GS1)	Annex I habitat [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (*important orchid sites)	144.6ha	2.7ha	1.9%	Yes
	Non Annex I [6210] Calcareous grassland (GS1)	65.4ha	3.4ha	5.2%	No
Improved agricultural grassland (GA1)		494.1ha	21.6ha	4.4%	No
Arable land (BC1)		7ha	2ha	28.6	No
Dense scrub (WS1)		6	0ha	0	No
Wet grassland (GS4)		Not calculated (associated with turlough habitat, see below)	0ha	N/A	No
Turloughs (FL6)		4.6ha	0ha	N/A	Yes
Stone walls (BL1)		41.86km (approx.)	2.99km (overestimate, as proposed access roads utilise existing gaps wherever possible)	7.1%	No
Hedgerows & associated Scrub (WL1)		6.66km	2.53km		Yes
Tree line (WL2)		0.52km	0.0km	0	No
Spoil and bare ground (ED3)		Not calculated	0ha	N/A	No
Recolonising bare ground (ED3)		Not calculated	0ha	N/A	No

Buildings and artificial surfaces (BL3)	6ha	0ha	N/A	No
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The Proposed Development will result in the loss of areas of habitat that are of Local Importance (Lower Value) and are not identified as KERs. This mainly involves the loss of improved agricultural grassland (GA1) and has been assessed as of low ecological value. Any direct or indirect impacts on habitats assessed as of local importance (lower value) not significant, including; Scrub (WS1), Recolonising bare ground (ED3) and Spoil and bare ground (ED2) etc. The effects on habitats that are identified as KERs are described in the below tables.

6.7.3.1.1 Assessment of Potential Effects on Calcareous Grassland (GS1) and Associated Habitats

Table 6-15: Assessment of Potential Effects on Calcareous Grassland (GS1) and Associated Habitats

Description of Effect	<p>The loss of Calcareous grassland (GS1) habitat, including intimate scrub mosaics, conforming to the Annex I habitat [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (*important orchid sites) to the Proposed Development footprint is 2.7 hectares. This is associated with parts of the footprints of Turbines T09, T10, T12, T13, T15 and T16 and associated site access tracks. All other turbines and associated infrastructure are located within Improved agricultural grassland (GA1) or Calcareous grassland (GS1) not conforming to any Annex I listed habitat.</p> <p>The remaining areas of Annex I semi-natural dry grasslands [6210/6210*] habitat have been entirely avoided in the design of the Proposed Development with no potential for any effect thereon.</p> <p>In the absence of appropriate best practice construction measures there is the potential to result in indirect effects on the habitat immediately adjoining the footprint through ground disturbance, temporary storage of materials and vegetation clearance.</p>
Characterisation of unmitigated effect	<p>The impact on the receptor at a site level is considered to be moderate as it only affects a small percentage of the overall habitat type within the site and the surrounding landscape.</p>
Assessment of Significance prior to mitigation	<p>The loss or degradation of semi-natural dry grasslands [6210/6210*] habitat has been assessed as a moderate negative effect on a small area of a receptor of National importance, in the absence of mitigation and biodiversity offsetting. The impact is restricted to a small percentage of the overall habitat within the site.</p>
Mitigation	<p>The Proposed Development has been deliberately designed to minimise loss of semi-natural dry grasslands [6210/6210*] habitat by siting turbines, access roads and associated infrastructure within Improved or semi-improved agricultural grassland (GA1). Proposed site access tracks have been strategically located in order to minimise the impact of the Proposed Development footprint on the receiving environment. This has been achieved by following existing informal agricultural access tracks and avoiding hilly areas within the site that would require significant cut and fill, thereby resulting in additional losses adjacent to the development footprint. It has been concluded that ‘no significant impacts on the land, soil and geology of the site of Proposed Development will occur during construction, operation, or during decommissioning phases’ (see Chapter 8 ‘Land, Soils and Geology of this EIAR).</p> <p>Where the Proposed Development footprint does occur on Annex I listed semi-natural dry grasslands [6210/6210*] habitat, the following measures will be implemented in advance of construction to minimise the area of habitat lost to the Proposed Development footprint:</p>

	<ul style="list-style-type: none"> ➤ Prior to any site clearance/enabling works, the required works area, including cut and fill, will be marked out using post and rope by the project engineer and project ecologist, ➤ There will be no temporary storage of materials within areas of Annex I listed semi-natural dry grasslands [6210/6210*] habitat, ➤ There will be no unnecessary tracking/shortcuts taken across areas of Annex I listed semi-natural dry grasslands [6210/6210*] habitat, ➤ During initial vegetation stripping, all topsoil material will be temporarily stored on site and used for “dressing” the edges of the development infrastructure during reinstatement/regrading. This will be particularly important in areas of cut and fill. The stripped topsoil will contain a natural seed source of local provenance and result in the establishment of a species rich grassland. <p>Where the development footprint does occur on Annex I listed semi-natural dry grasslands [6210/6210*] habitat, the Proposed Development provides for the replacement of calcareous grassland habitat through the provision of a “Farm Plan” for each of the subject landowners. This farm plan has been developed to revert areas of improved or semi-improved agricultural grassland back to vegetation communities similar to those occurring within adjacent areas of Annex I grassland habitat. The farm plan will be agreed to by the subject landowners who will implement the necessary actions in consultation with the project ecologist. Additional grassland creation is proposed around turbine bases and access tracks wherever this is possible. The management actions are fully described in a site-specific Biodiversity Management and Enhancement Plan (BMEP), provided in Appendix 6-4 of the EIAR. The measures set out in the BMEP will ensure that there will be no net loss of species rich semi-natural dry grassland habitat associated with the Proposed Development. It is proposed to undertake enhancement of this area of semi-natural dry grasslands equating to between approximately 9-12 hectares.</p> <p>In addition to the enhancement of grassland to species rich semi-natural dry grassland habitat, landowners of lands within the EIAR boundary have also signed up to an agreement that there will be no further land reclamation within areas conforming to the Annex I listed semi-natural dry grasslands [6210/6210*] habitat. This is the primary reason for the loss/decline/degradation of this habitat locally, nationally and internationally²⁷.</p> <p>Grassland management and reversion from improved/semi-improved agricultural grassland to species rich grassland will be undertaken within a number of land parcels, see Appendix 6-5. Following the implementation of the measures outlined in this report, to offset the loss of Annex I listed semi-natural dry grasslands [6210/6210*] habitat associated with the development footprint, there will be no residual net loss of species rich grassland as a result of the Proposed Development. The management measures and extent of lands subject to restoration are shown in Figures 2-1 – 2-3, Appendix 6-5 of the EIAR.</p>
<p>Residual Effect following Mitigation</p>	<p>Following the implementation of mitigation and land management measures/offsetting, there will be no significant residual effect on Annex I listed semi-natural dry grasslands [6210/6210*] habitat at any geographic scale. A total area of between approximately 9 – 12 ha (a minimum of three times of the area lost to the footprint) will be created under the BMEP (see Appendix 6-5), which will result in a long-term net gain in this habitat within the locality of the Proposed Development. The restriction on any further land reclamation within areas conforming to those listed as Annex I dry grassland will have a further local positive impact.</p>

6.7.3.1.2 Assessment of Potential Effects on Hedgerow

Table 6-16: Assessment of Potential Effects on Hedgerow

²⁷ NPWS (2019). *The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O’Neill*

<p>Description of Effect</p>	<p>Approximately 2.53km of hedgerow/scrub will be permanently removed within and around the footprint of the Proposed Development. Removal of this combined length hedgerow/scrub is required to achieve the required buffer distance for the protection of bats, from the turbines to the canopy of the nearest habitat feature, as recommended by the Natural England (2014) and NatureScot (2021) (see Section 6.7.3.2.1).</p>
<p>Characterisation of unmitigated effect</p>	<p>The permanent loss of approximately 2.53 linear metres of hedgerow and scrub would constitute a permanent negative effect on the hedgerow habitat within the site, albeit a slight one within the context of the surrounding landscape given that the majority of hedgerow within the site is species poor and gappy in places, that and habitat of this nature is widespread and common in the wider area.</p>
<p>Assessment of Significance prior to mitigation</p>	<p>The permanent loss of the proposed 2.53km of hedgerow is not considered to be a significant effect at any greater than the local geographical scale, as this habitat is widespread and common within the local farmland in the wider area. Removal of the proposed sections of hedgerow, which are gappy in places, to accommodate the required buffers for the proposed development would nonetheless have the potential to lead to a significant reduction in this habitat within the EIAR boundary.</p>
<p>Mitigation</p>	<p>To compensate for the loss of 2.53km of hedgerow it is proposed to plant 2.82km of new hedgerow to offset this potential loss and to provide additional habitat connectivity within the site (see also Section 6.7.3.2.1).</p> <p>Table 6-1 of the Bat Report (Appendix 6-2) provides further details on all linear habitat features within the proposed turbine buffers which are proposed for removal for the duration of the Proposed Development, as well as proposed replanting associated with each turbine. The locations in which the proposed planting will take place will be subject to final landowner agreement. However, indicative areas for planting are proposed in Figures 6-1 and 6-2 of the Bat Report (Appendix 6-2).</p> <p>Overall, the proposed replanting will result in a net gain of approximately 290m in the linear landscape features within the site. Planting will be of species indigenous to the local area. Further details are provided in Chapter 12 of this EIAR 'Landscape and Visual Assessment'.</p>
<p>Residual Effect following Mitigation</p>	<p>Following implementation of mitigation, no potential for significant effect exists at any geographic scale. The planting of additional hedgerow will serve to enhance the hedgerow habitat within the site due to increased species diversity compared to that to be lost, will benefit wildlife and due to the increase of approximately 290 linear metres over that to be lost, will result in a net gain in this habitat within the site.</p>

6.7.3.1.3 Assessment of Potential Effects on Watercourses and Sensitive Aquatic Faunal Species

Table 6-17: Potential for impact on Watercourses and Sensitive Aquatic Species

<p>Description of Effect</p>	<p>This section assesses the potential for likely significant effects on aquatic receptors including aquatic habitats (i.e. watercourses), salmonids, lamprey, coarse fish, white-clawed crayfish, European eel, aquatic invertebrates, molluscs and other aquatic species identified during the desk study and detailed survey work and likely to occur downstream of the Proposed Development.</p> <p>There are no watercourses located within or adjacent to the footprint of the Proposed Development, with the exception of the Grid Connection route (see Sections 4.2 & 4.7 of the EIAR for further details). No in-channel works are proposed and no impediment to movement along any watercourses will result; therefore, there is no potential for the Proposed Development to result in any barrier to the movement of aquatic species. A general description of the various construction methods employed at watercourse crossings along the Grid Connection route are described in Section 4.7.5.3, Chapter 4</p>
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	<p>of the EIAR. The measures minimise potential for impact on the receiving environment.</p> <p>Given the karst nature of the landscape, there is the potential for the development to result in indirect deterioration in water quality to downstream aquatic receptors via groundwater pathways.</p> <p>There is also the potential for the activities associated with the installation of the Grid Connection route to result in the runoff of silt and other pollutants such as hydrocarbons and cementitious material in the absence of mitigation.</p> <p>In the absence of appropriate bespoke mitigation measures, the construction phase of the proposed Grid Connection has the potential to result in indirect effect on aquatic receptors in the form of water pollution.</p> <p>These potential effects on water quality are fully described and assessed in Chapter 9 ‘Hydrology and Hydrogeology’ of this EIAR and are described here in relation specifically to ecology.</p>
<p>Characterisation of unmitigated effect</p>	<p>In the absence of mitigation, the indirect effect of water pollution on aquatic receptors during construction has the potential be a short-term reversible impact on watercourses which act as a conduit to downstream habitats. The magnitude of any such impact is likely to be at worst moderate, given that all major infrastructure such as turbine bases, site compound etc. are located away from any significant watercourse.</p>
<p>Assessment of Significance prior to mitigation</p>	<p>In the absence of mitigation and following the precautionary principle, there is potential for the proposed Grid Connection to result in moderate indirect effects on the identified aquatic habitats and species at a local geographic scale in the form of pollution during the construction phase.</p>
<p>Mitigation</p>	<p>A Drainage Management Plan for the Proposed Development is provided in Appendix 4-8 of this EIAR with the details of drainage design fully described in Section 4.6, Chapter 4. This plan provides details of how water quality will be protected during the construction of the Proposed Development, in particular the proposed Grid Connection. In addition to this, specific mitigation is provided in relation to water quality in Chapter 9: ‘Hydrology and Hydrogeology’ of this EIAR, see Section 9.4.2. Drainage inspection and maintenance is detailed in the Construction Environmental Management Plan (CEMP) that is provided as Appendix 4-9 to Chapter 4 of this EIAR, which also provides the details of exactly how the measures will be implemented during construction.</p>
<p>Residual Effect following Mitigation</p>	<p>Following the implementation of mitigation, there will be no significant residual effect on aquatic habitats or species as a result of the Proposed Development.</p>

6.7.3.1.4 Turloughs

Table 6-18: Potential for impact on turloughs

<p>Description of Effect</p>	<p>This section assesses the potential for likely significant effects on turlough (groundwater based) habitat identified during the desk study and site surveys.</p> <p>Given the karst nature of the landscape, there is the potential for the development to result in indirect deterioration in water quality to downstream aquatic receptors via groundwater pathways.</p> <p>In the absence of appropriate mitigation measures and standard best practice, the construction phase of the proposed Grid Connection has the potential to result in indirect effect on aquatic receptors in the form of water pollution.</p>
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	<p>These potential effects on water quality are fully described and assessed in Chapter 9 'Water' of this EIAR and are described here in relation specifically to ecology.</p>
<p>Characterisation of unmitigated effect</p>	<p>In the absence of mitigation, the indirect effect of water pollution on aquatic receptors during construction has the potential be a short-term reversible negative impact on turloughs. The magnitude of any such impact is likely to be at worst moderate, given the relatively thick subsoils identified during borehole drilling, trial pitting and correlated with the geophysics, which provides confidence in the level of subsoil protection to the underlying groundwater aquifer across the Northern and Southern Clusters (see Section 9.4.2.8, Chapter 9).</p>
<p>Assessment of Significance prior to mitigation</p>	<p>In the absence of mitigation and following the precautionary principle, there is potential for the Proposed Development to result in significant indirect effects on the identified groundwater-dependant turlough habitats and species at a local geographic scale in the form of pollution during the construction phase.</p>
<p>Mitigation</p>	<p>A Drainage Management Plan for the Proposed Development is provided in Appendix 4-8 of this EIAR with the details of drainage design fully described in Section 4.6, Chapter 4. This plan provides details of how water quality will be protected during the construction of the Proposed Development, in particular the proposed Grid Connection. In addition to this, specific mitigation is provided in relation to water quality in Section 9.4.2.8, Chapter 9: 'Hydrology and Hydrogeology' of this EIAR. Mitigation measures relating to hydrocarbons, cementitious materials and wastewater disposal, as outlined in Sections 9.4.2.5, 9.4.2.6 and 9.4.2.7 of Chapter 9 will provide adequate protection to groundwater and surface water quality and ensure that groundwater quality will not be impacted, thus protecting the groundwater quality of any hydraulically downgradient turloughs.</p> <p>Drainage inspection and maintenance is detailed in the Construction Environmental Management Plan (CEMP) that is provided as Appendix 4-9 of this EIAR, which also provides the details of exactly how the measures will be implemented during construction.</p>
<p>Residual Effect following Mitigation</p>	<p>Following the implementation of mitigation, there will be no significant residual effect on turlough habitats or associated species as a result of the Proposed Development.</p>

6.7.3.2 Effects on Fauna During Construction

The Proposed Development has the potential to result in habitat loss and disturbance impacts on faunal species that were recorded on the site but were not included as KERs, see Table 6-13. Given the extensive area of habitat that will remain undisturbed throughout the site and the avoidance of the most significant areas of faunal habitat (semi-natural dry grassland, large areas of hazel scrub and turloughs), no significant effects on non-KER faunal biodiversity are anticipated as a result of the Proposed Development. Therefore, these species were excluded from further assessment.

The potential for significant effects on aquatic species is restricted to indirect effects on their habitat resulting from water pollution. This has been assessed in Sections 6.7.3.1.2 and 6.7.3.1.3 above and is not repeated below.

6.7.3.2.1 Assessment of Potential Effects on Bats

Table 6-19 Assessment of Potential Impacts on Bats

<p>Description of Effect</p>	<p>As per NatureScot Guidance, wind farms present four potential risks to bats:</p> <ul style="list-style-type: none"> • Collision mortality, barotrauma and other injuries; (Operational Phase Impact) • Loss or damage to commuting and foraging habitat; • Loss of, or damage to, roosts; • and Displacement of individuals or populations. <p>For each of these four risks, the detailed knowledge of bat distribution and activity within the survey area has been utilised to predict the potential effects of the Proposed Development on bats (operational phase impacts relating to collision mortality, barotrauma and other injuries are assessed in Section 6.7.4).</p> <p>Bat surveys undertaken in 2020, in accordance with NatureScot (formerly Scottish Natural Heritage) Guidance 2019²⁸ and consistent with the amendments described in the NatureScot 2021²⁹ guidance, form the core dataset for the assessment of effects on bats.</p>
<p>Characterisation of unmitigated effect</p>	<p>Loss or damage to commuting and foraging habitat</p> <p>In absence of appropriate design, the loss or degradation of commuting/foraging habitat has potential to reduce feeding opportunities and/or displace bat populations. However, the Proposed Development is predominantly located within agricultural and dry calcareous grasslands and there will be no net loss of bat foraging/commuting habitat associated with the Proposed Development.</p> <p>As part of the Proposed Development, some small areas of scrub clearance and site preparation works will be required within and around the development footprint to allow the construction of turbine bases, access roads and the other ancillary infrastructure. There are no areas of forestry within the Proposed Development site. Therefore, there is no requirement for a Felling Licence application to the Forest Service.</p> <p>Approximately 2.53km of hedgerow/scrub will be permanently removed within and around the footprint of the Proposed Development. This removal of hedgerow/scrub is provided to achieve the required buffer distance for the protection of bats, from the turbines to the canopy of the nearest habitat feature, as recommended by the Natural England (2014) and NatureScot (2021). Further details on buffer calculations can be found in section 6.1.3 of this report.</p> <p>The majority of stone walls within the site will be maintained as part of the Proposed Development. Proposed replanting will ensure there will be no significant effect in relation to habitat fragmentation or loss of foraging habitat for bats in the area. Table 6-1, Section 6.1.4 of the Bat report (see Appendix 6-2), describes linear habitat features within the proposed turbine buffers, which are proposed for removal for the duration of the Proposed Development, as well as proposed replanting associated with each turbine.</p> <p>Overall, the proposed replanting will result in a net gain of approximately 290m in the linear landscape features within the site. Planting will be of species indigenous to the local area. This will have a positive impact on bats as it will provide more commuting and foraging opportunities.</p>

²⁸ Scottish Natural Heritage published *Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation (SNH 2019)*.

²⁹ NatureScot published *Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation. Version: August 2021 (NatureScot, 2021)*.

	<p>Where upgrades to existing roads and site tracks are proposed, there may be some requirement for road widening to facilitate the initial construction phase. No permanent road widening, or junction accommodation works are required along the turbine delivery route. Some temporary hardcore surfacing will be required at roundabouts or areas of oversail. Some minor modifications to street furniture will also be required along the turbine delivery route such as temporary removal of some street signs, traffic lights, etc. No loss of, or damage to, commuting or foraging habitats is anticipated to facilitate the turbine delivery.</p> <p>The underground cable route will be confined to existing site and public roads. There will be no requirement to remove trees/hedgerows etc. as part of the underground cable route and no loss or damage to commuting or foraging habitats is anticipated.</p> <p>Given the extensive area of habitat that will remain undisturbed throughout the site, the avoidance of the most significant areas of faunal habitat (i.e. natural hedgerows and scrub) and the proposed replanting to be carried out no significant effects with regard to loss of commuting and foraging habitat are anticipated; the proposed net gain in linear landscape features within the site will result in a long-term positive impact at the local level.</p> <p>Loss of, or damage to, roosts</p> <p>The Proposed Development is located within an area of agricultural and dry calcareous grasslands. The trees within the site are comprised predominantly of hawthorn, blackthorn and hazel, and do not provide potential roosting habitat of significance for bats. One derelict structure was identified as a roost outside the EIAR Site Boundary (see the Bat Report, Appendix 6-2). A small number of bats were observed emerging and re-entering the building during the roost surveys; however, the structure will be avoided and retained, thus no loss or damage to roosts is anticipated.</p> <p>The underground cabling will connect from the Proposed Development site to the existing Athlone 110kV substation, predominately confined to proposed and existing roads and tracks. There will be no requirement to remove trees/hedgerow as part of the underground cable route. Therefore, there will be no loss of tree roosting habitat or linear landscape connectivity associated with these works.</p> <p>Although no bats were observed, and no evidence of bat use was identified within the bridges, the stone arch bridge (WC2) along the cable route was assessed as having moderate value for roosting bats; the concrete arch bridge (WC5) was also assessed as having low value potential for roosting bats. The bridges along the route will not be altered, in any regard, by the proposed works as the options for crossing bridges do not require any works to be carried out on the bridge structure. The cable will either be installed within the road surface or else directional drilling will be used. No loss of potential roosting habitat is anticipated.</p> <p>No potential for significant effect with regard to the loss of, or damage to, roosting habitat as a result of the Proposed Development or underground cable route, is anticipated.</p> <p>Displacement of individuals or populations</p> <p>The Proposed Development is predominantly located within agricultural and dry calcareous grasslands. There will be no net loss of linear landscape features for commuting and foraging bats and there will be no loss of any roosting site of ecological significance. The habitats on the site will remain suitable for bats and no significant displacement of individuals or populations is anticipated.</p>
<p>Assessment of Significance prior to mitigation</p>	<p>There is no potential for the construction of the Proposed Development to result in any significant effects on the local bat population at any geographic scale. No roosts were recorded close to the infrastructure, and no potential for significant effects with regard</p>

	<p>to the loss of, or damage to, roosting habitat as a result of the Proposed Development, is anticipated.</p> <p>Furthermore no potential for significant effects in relation to loss or damage to commuting and foraging habitat or displacement of individuals or populations was identified at any geographic scale. The bat survey report, which is included in Appendix 6-2, provides further detail and analysis with regards to impact assessment on bat species.</p>
<p>Mitigation</p>	<p>Whilst no significant effects on bat species have been identified in relation to habitat loss, the following potential positive effects are noted. Overall, the proposed replanting will result in a net gain of approximately 290m in the linear landscape features within the site as noted above will have a positive impact on bats as it will provide increased commuting and foraging opportunities (see Section 6.1.4 of Appendix 6-2, Bat Report).</p> <p>In the absence of appropriate design, the loss or degradation of commuting/foraging habitat has potential to reduce feeding opportunities and/or displace bat populations. However, the Proposed Development is predominantly located within agricultural and dry calcareous grasslands and linear landscape features such as hedgerows, trees and stone walls have been largely retained or avoided.</p> <p>The majority stone walls within the site will be protected and maintained as part of the Proposed Development. While stone walls are classified as low-quality linear features, replanting design has been curated to draw bats away from turbine buffers. The loss of the proposed short sections will not result in any significant effect in relation to habitat fragmentation or loss of foraging habitat for bats in the area.</p> <p>To comply with NatureScot recommendations in relation to habitat buffering to avoid bat fatalities, a total of 2.53km of hedgerow/tree habitat will be lost as a result of the recommended buffers applied for bats (see Table 6-1 of the Bat Report, Appendix 6-2 of this EIAR). There is an extensive network of linear landscape features in the wider area that will be fully retained, and the loss of hedgerow/trees is not anticipated to have a significant effect on local bat populations. However, it is proposed to plant 2.82km of new hedgerow to offset any potential loss in linear habitat features and to provide additional new opportunities for commuting and foraging bats. Table 6-1 of the Bat Report describes linear habitat features within the proposed turbine buffers which are proposed for removal for the duration of the Proposed Development as well as proposed replanting associated with each turbine. The locations in which the proposed planting will take place will be subject to final landowner agreement. However, indicative areas for planting are proposed in Figures 6-1 and 6-2 of the Bat Report (Appendix 6-2).</p> <p>Overall, the proposed replanting will result in a net gain of approximately 290m in the linear landscape features within the site. Planting will be of species indigenous to the local area. Further details are provided in Chapter 12 of this EIAR 'Landscape and Visual Assessment'.</p> <p>Consequently, no significant effects with regard to loss of commuting and foraging habitat are anticipated.</p> <p>The following best practice and site-specific mitigation measures will be employed to avoid and reduce the potential for significant displacement/ disturbance effects on local bat populations (as fully detailed in Section 6 of the Bat Report (Appendix 6-2):</p> <p>Noise Restrictions</p> <p>During the construction phase, plant machinery will be turned off when not in use and all plant and equipment for use will comply with the Construction Plant and Equipment Permissible Noise Levels Regulations (S.I. No. 632 of 2001SI 359/1996).</p> <p>Lighting Restrictions</p>

<p>Where lighting is required, directional lighting will be used to prevent overspill on to woodland/forestry edges. Exterior lighting, during construction (and post construction), shall be designed to minimize light spillage, thus reducing the effect on areas outside the Proposed Development, and consequently on bats i.e. Lighting will be directed away from mature trees/treelines around the periphery of the site boundary to minimize disturbance to bats. Directional accessories can be used to direct light away from these features, e.g. through the use of light shields (Stone, 2013). The luminaries will be of the type that prevent upward spillage of light and minimize horizontal spillage away from the intended lands.</p> <p>The proposed lighting around the site shall be designed in accordance with the Institute of Lighting Professionals Guidance Note 08/18 Bats and artificial lighting in the UK.</p> <p>In addition, the applicant commits to the use of lights during construction, operation and decommissioning (such that they are necessary) in line with the following guidance that is provided in the Dark Sky Ireland Lighting Recommendations:</p> <ul style="list-style-type: none"> > Every light needs to be justifiable, > Limit the use of light to when it is needed, > Direct the light to where it is needed, > Reduce the light intensity to the minimum needed, > Use light spectra adapted to the environment, when using white light, use sources with a “warm” colour temperature (less than 3000K). <p>With regard to the potential for lighting to increase collision risk, it is noted that there will be some illumination of the turbines in the form of aviation lighting, and whilst this lighting is unlikely to result in any significant increase in collision risk, a comprehensive and site-specific mitigation and monitoring programme, described in section 6.2 of the Bat Report (Appendix 6-2), is proposed for a period of at least 3 years post construction. No significant effects of lighting on bats are anticipated; however, if in the course of this monitoring, any potential for significant effects on bats is identified, specific measures including curtailment, will be implemented to avoid any such impacts.</p>	<p>Where lighting is required, directional lighting will be used to prevent overspill on to woodland/forestry edges. Exterior lighting, during construction (and post construction), shall be designed to minimize light spillage, thus reducing the effect on areas outside the Proposed Development, and consequently on bats i.e. Lighting will be directed away from mature trees/treelines around the periphery of the site boundary to minimize disturbance to bats. Directional accessories can be used to direct light away from these features, e.g. through the use of light shields (Stone, 2013). The luminaries will be of the type that prevent upward spillage of light and minimize horizontal spillage away from the intended lands.</p> <p>The proposed lighting around the site shall be designed in accordance with the Institute of Lighting Professionals Guidance Note 08/18 Bats and artificial lighting in the UK.</p> <p>In addition, the applicant commits to the use of lights during construction, operation and decommissioning (such that they are necessary) in line with the following guidance that is provided in the Dark Sky Ireland Lighting Recommendations:</p> <ul style="list-style-type: none"> > Every light needs to be justifiable, > Limit the use of light to when it is needed, > Direct the light to where it is needed, > Reduce the light intensity to the minimum needed, > Use light spectra adapted to the environment, when using white light, use sources with a “warm” colour temperature (less than 3000K). <p>With regard to the potential for lighting to increase collision risk, it is noted that there will be some illumination of the turbines in the form of aviation lighting, and whilst this lighting is unlikely to result in any significant increase in collision risk, a comprehensive and site-specific mitigation and monitoring programme, described in section 6.2 of the Bat Report (Appendix 6-2), is proposed for a period of at least 3 years post construction. No significant effects of lighting on bats are anticipated; however, if in the course of this monitoring, any potential for significant effects on bats is identified, specific measures including curtailment, will be implemented to avoid any such impacts.</p>
<p>Residual Effect following Mitigation</p>	<p>There is no potential for the construction of the Proposed Development to result in Significant effects on bat populations at any geographic scale. There will be no significant effect on the conservation status of any bat species as defined in ‘<i>The Status of Protected Habitats and Species in Ireland</i>’ (NPWS, 2019).</p>

6.7.3.2.2 Assessment of the Potential Impacts on Badger

Table 6-20: Potential impacts on badgers

<p>Description of Effect</p>	<p>Habitat Loss/Fragmentation</p> <p>Given the nature of the Proposed Development, there will be some minimal loss of suitable badger foraging habitat i.e., arable fields (BC1), improved agricultural grassland (GA1) and Calcareous grassland (GS1) associated with the footprint of the proposed infrastructure.</p>
<p>Description of Effect</p>	<p>Disturbance</p> <p>Given the location of the setts recorded within the site, there is the potential for disturbance to a single entrance outlier badger sett. There is potential for direct mortality of badgers as a result of the proposed construction works, where they occur in close proximity to an outlier sett, in the absence of mitigation. The remaining single entrance sett, recorded over 150metres further to the north, is considered to be located outside the likely zone of impact from the proposed access road infrastructure.</p>

Characterisation of unmitigated effect	Habitat Loss/Fragmentation The loss of existing arable field, improved agricultural grassland and Calcareous grassland is not considered to be significant given the relatively small scale of the Proposed Development footprint within the extensive area of available suitable habitat locally.
	Disturbance Noise and earth movement during construction works have the potential to disturb badgers occupying setts in close proximity to proposed infrastructure during construction. Badger tunnel systems can extend some distance from sett entrances (over 20m in some cases ³⁰) and therefore any excavation by heavy machinery in close proximity to sett entrances risks causing damage to setts and/or direct harm to badgers in the absence of mitigation. The access route for the development has been located specifically to avoid impacts on setts recorded during site surveys as far as possible, being located approximately 35m away from the closest sett. Therefore, minimal short-term disturbance effects are anticipated.
Assessment of Significance prior to mitigation	Habitat Loss/Fragmentation No significant overall loss or fragmentation of badger foraging habitat is anticipated at any geographic scale.
	Disturbance The potential for physical damage or significant disturbance of occupied setts has been minimised through the sensitive location of the proposed site access roads and other infrastructure. Two active sett entrances have been identified within the site, which appeared to be used only intermittently. Potential for disturbance to badgers has therefore been assessed as slight at the local geographic scale in the absence of mitigation.
Mitigation	Habitat Loss/Fragmentation The proposed site infrastructure will be relatively small scale in nature and as such no specific mitigation is required for the avoidance of habitat loss.
	Disturbance/Displacement In order to fully assess the potential for disturbance related effects on badgers at during construction, especially given the time that can elapse between the original surveys and any future planning consent and construction, a pre-construction badger survey will be carried out in order to assess activity levels at setts and to identify any additional sett entrances that may have been excavated in the intervening period. All setts recorded within 50m of the development (including the identified sett approximately 35m from the proposed access road) will subsequently be monitored for a minimum period of 2 weeks using remote cameras in order to ascertain use by badgers and levels of activity, and to assess the requirement for additional mitigation measures. All badger survey work will be undertaken in line with current best practice guidance ³¹ . Should any setts within 50m of the proposed works be found to be in active use by badgers during the pre-construction badger monitoring, it would be necessary to ensure that the risk of disturbance to badgers is mitigated appropriately. Any badger mitigation required would be undertaken following published best practice guidelines for the treatment of badgers (NRW, 2006) and in consultation with NPWS. If works within 30m of an active sett are to take place during the badger breeding season (i.e. July 1 st – November 30 th) temporary exclusion of these setts during the construction phase would be required. The setts would

³⁰ National Roads Authority (2009) Guidelines for the treatment of badgers prior to the construction of National Road Schemes.

³¹ National Roads Authority (2006) Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes.

	<p>be excluded and closed in consultation with NPWS, and subsequently re-opened following completion of construction to allow badgers to recolonise them.</p> <p>Taking a highly precautionary approach, the following measures will be undertaken for the avoidance of disturbance/displacement and will be implemented during the construction phase of the Proposed Development to avoid machinery access or materials storage in close proximity to the identified badger sett occurring between 30 - 50 metres of the proposed infrastructure:</p> <ul style="list-style-type: none"> ➤ Exclusion zone fencing and appropriate signage will be put in place along the section of access road occurring within the area of the outlier badger sett. This will ensure that there will be no vehicle tracking away from the works area and no temporary storage of construction materials that could impact the sett. <p>All of the above works will be undertaken or supervised by an appropriately qualified ecologist in advance of construction.</p>
<p>Residual Effect following Mitigation</p>	<p>Habitat Loss/Fragmentation</p> <p>No significant fragmentation to or loss of badger foraging habitat is anticipated at any geographic scale.</p>
	<p>Disturbance</p> <p>Following the incorporation of the mitigation measures described above, no significant negative impacts to badgers is anticipated at any geographic scale.</p>

6.7.3.2.3 Assessment of Potential Effects on Otter

Table 6-21: Assessment of Potential Impacts on otter

<p>Description of Effect</p>	<p>The current proposal has been designed to minimise impacts on the receiving environment and maximises the use of existing infrastructure such as existing public roads for crossing watercourses. The Proposed Development footprint is dominated by grassland habitats and there are no watercourses occurring in close proximity to any of the proposed turbine infrastructure. The only requirement for works at existing watercourse crossings is for the installation of the proposed Grid Connection route within the existing public road network i.e. the R363. Section 4.8.5, Chapter 4 of this EIAR describes the installation options for the proposed Grid Connection route.</p> <p>Potential for effects on otter has been considered with regard to NPWS ‘<i>Threat Response Plan</i>’³² (TRP) which identifies four significant threats facing otter in an Irish context: habitat destruction, water pollution, disturbance (recreational sources) and accidental death/persecution.</p>
<p>Characterisation of unmitigated effect</p>	<p>Only a single otter spraint was recorded during the dedicated otter surveys. This was recorded along a tributary of the Cross River. The location of the otter spraint and associated tributary, that flows under the R363 in which the proposed Grid Connection will be located, is shown in Figure 6-13. Given the layout of the Proposed Development, no significant habitat destruction, no loss of breeding or resting places and no direct mortality related impacts on this species are anticipated. Only minor Grid Connection installation works are proposed within the R363. Therefore, there is no potential for the Proposed Development to result in any barrier to the movement of otter.</p> <p>Taking a precautionary approach, it is assumed that otter may occur in the EIAR survey area on occasion, particularly the lower reaches of the main watercourses</p>

³² NPWS (2009) *Threat Response Plan: Otter (2009-2011)*. National Parks & Wildlife Service, Department of the Environment, Heritage & Local Government, Dublin.

	<p>downstream of the Grid Connection route. There is potential for the construction activity to result in the run-off of silt and other pollutants such as hydrocarbons and cementitious material into land drains and minor watercourses. This represents a potential indirect effect on otter in the form of habitat degradation through water pollution.</p> <p>In relation to disturbance, otter are predominantly crepuscular in nature and it is anticipated that construction activity will mostly be confined to daytime hours, thus minimizing potential disturbance related impacts to the species. Channin P (2003) provides a literary review with regard to anthropogenic disturbance and refers to several reports which have found that disturbance is not detrimental to otters (Jefferies (1987), (Durbin 1993). (Green & Green 1997). Irish Wildlife Manual No 76 (National Otter Survey of Ireland 2010/2012) notes that the occurrence of otter was unaffected by perceived levels of disturbance at the survey sites. It also notes that there is little published evidence demonstrating any consistent relationship between otter occurrence and human disturbance (Mason & Macdonald 1986, Delibes et al. 1991; Bailey & Rochford, 2006).</p>
<p>Assessment of Significance prior to mitigation</p>	<p>There will be no significant effects resulting from habitat destruction, barrier effect, disturbance and mortality on otters.</p> <p>In the absence of mitigation, the indirect effect of water pollution on otter during construction has the potential be a short-term reversible impact. The magnitude of any such impact is likely to be at worst moderate, given that all Grid Connection works will be located within or adjacent to the existing main road infrastructure.</p>
<p>Mitigation</p>	<p>Specific mitigation is provided in relation to water quality in Chapter 9: “Water” of this EIAR. In addition, the outline Construction Environmental Management Plan (CEMP) that is provided as Appendix 4.8 provides the details of exactly how the measures will be implemented during construction.</p>
<p>Residual Effect following Mitigation</p>	<p>Following the implementation of mitigation, there will be significant residual effects on Otter.</p>

6.7.4 Likely Significant Effects During Operational Phase

6.7.4.1 Effects on Habitats during Operation

The operation of the Proposed Development will not result in any additional land take or loss of peatland habitats and as such there is no potential for any significant effects in this regard. These habitats are not considered to be KERs in the context of the operation of the Proposed Development.

The implementation of the Biodiversity Management and Enhancement Plan will ensure that any Annex I semi-natural dry grassland (6210/ 6210*) habitat that is lost to facilitate the proposed infrastructure will be replaced within the EIAR Site Boundary. The Biodiversity Management and Enhancement Plan (BMEP) provided in Appendix 6-5 includes for the management and reversion of between approximately 9-12 hectares of improved – semi-improved agricultural grassland back to a species-rich dry grassland community. In addition, under the BMEP there will be no further land reclamation within areas of Annex I semi-natural dry grassland (6210/ 6210*) habitat for the lifetime of the Proposed Development, see Appendix 6-5. Individual farm plans will be prepared for each landowner whose lands will be subject to the commitments set out in the BMEP, which will commence during the construction phase of the Proposed Development and will be maintained for the operational lifetime of the Proposed Development.

Due to the absence of watercourses in close proximity to the proposed turbine infrastructure and the fact that the Grid Connection will be located within or adjacent to the existing road network (R363), no

potential for negative impacts on surface water quality has been identified during the operational phase of the Proposed Development.

The detailed hydrological assessment for the Proposed Development (see Chapter 9 of this EIAR and Appendix 9-6 – Water Framework Directive Assessment) has concluded that there is no potential for significant effects to surface water and groundwater quality, following implementation of the proposed mitigation measures. The Proposed Development will therefore not prevent the objectives of the WFD being achieved or result in any change in WFD status of any waterbodies.

6.7.4.2 Effects on Fauna during Operation

The operation of the Proposed Development will not result in any additional habitat loss or deterioration, nor will it result in a significant increase in anthropogenic activity due to its location and scale.

The Biodiversity Management and Enhancement Plan measures described in Appendix 6-4 will result in the establishment of habitats of higher value for local faunal species. As such the operation of the Proposed Development will not result in a significant impact at any geographic scale. Such measures will have positive effects on the non-volant terrestrial fauna at the site of the Proposed Development. There is no potential for significant negative effects on non-volant terrestrial fauna including otter or badger that were identified as KERs during the construction phase of the development.

The operation of the Proposed Development will not have any effect on marsh fritillary or habitat for the species. No marsh fritillary populations were recorded within the site, despite extensive searches in September 2020 and March 2021.

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

It should be noted that no significant habitat for salmonids, lamprey, white-clawed crayfish, European eel, aquatic invertebrates or other aquatic species is present within the Wind Farm component of the Proposed Development, and all major infrastructure such as turbine bases are located over 50 metres from the watercourses within the Proposed Development site which occur along the Grid Connection route, see Figure 9-3, Chapter 9 ‘Water’ of this EIAR. The potential for significant effects on the above aquatic species is restricted to indirect effects on their habitat resulting from water pollution. This has been assessed in Section 6.7.3.1.2 and is not repeated below.

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

6.7.4.2.1 Assessment of Potential Effects on Bats during Operation

Table 6-22: Assessment of Potential Impacts on Bats

Description of Effect	<p>There is no potential for loss or fragmentation of foraging or roosting habitat for bat species during the operational phase of the Proposed Development as there will be no additional loss of any habitats following construction.</p> <p>The bat survey report that is provided in Appendix 6-2 found bat species composition and abundance to be typical of the geographic location and largely open nature of the site, and that the site is utilised by a regularly occurring bat population of Local Importance.</p>
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	<p>The operational phase of the Proposed Development poses a potential risk to bats in the form of collision mortality, barotrauma and other injuries cause by bats coming into contact or close proximity to operational turbines.</p>
<p>Characterisation of unmitigated effect</p>	<p>The operation of the Proposed Development has the potential to result in a long-term effect on Pipistrelle species (common, soprano and Nathusius) and Leisler’s bat species as a result of mortality due to collision. Section 5.1.2 of the Bat Report (provided as Appendix 6-2) sets out the overall collision risk assessment for these high collision risk species.</p> <p>Site-level collision risk for high collision risk bat species (following NatureScot 2021 guidance) was typically Medium (see Section 5.1.3 and Section 6-2 of the Bat Report for details of collision risk and how this was calculated). Overall bat activity levels were typical of the nature of the site, which is predominantly agricultural and dry calcareous grasslands with low levels of bat activity recorded during the static detector surveys as well as the walked transects undertaken. However, some high median activity levels across at least one season during the static detector surveys carried out, and high collision risk was recorded at median and peak activity levels It is also noted from NatureScot (2021) that bat activity on windfarm sites is highly liable to change following construction of a wind farm due to the changes in habitat that occur to facilitate construction.</p>
<p>Assessment of Significance prior to mitigation</p>	<p>Following the precautionary principle, there is potential for the operation of the Proposed Development to result in Significant effects on the local bat population in the absence of mitigation.</p>
<p>Mitigation</p>	<p>In order to reduce the value of the habitat for bat species in the areas surrounding the turbines, a buffer of at least 50m between the tip of the blade and any trees or other tall vegetation that could provide high quality foraging habitat for bat species, will be implemented. Further details of this mitigation and how it is calculated is provided in Appendix 6-2.</p> <p>Blade Feathering</p> <p>On a precautionary basis, and in addition to buffers applied to habitat features, it is proposed that all wind turbines are subject to ‘feathering’ of turbine blades when wind speeds are below the cut-in speed of the proposed turbine. This means that the turbine blades are pitched at 90 degrees or parallel to the wind to reduce their rotation speed to below two revolutions per minute while idling. This measure has been shown to significantly reduce bat fatalities (by up to 50%) in some studies (NIEA, 2021).</p> <p>Bat Mitigation and Monitoring Plan</p> <p>Taking a precautionary approach, and given that high collision risk was recorded at median and peak activity levels, an adaptive monitoring and mitigation strategy has been devised for the Proposed Development in line with the case study example provided in Appendix 5 of the NatureScot (2021) Guidance and based on the site-specific data.</p> <p>Whilst no significant mortality effects are anticipated in relation to the current project, an adaptive curtailment strategy will be implemented from the outset, on a precautionary basis based on the levels of bat activity recorded during the baseline surveys carried out. This would involve curtailment during the period with occasional high peaks in Common, Soprano and Nathusius’ pipistrelle, Leisler’s bat and Myotis spp. activity, with simultaneous activity monitoring taking place. Turbines would be curtailed during the weather conditions most suitable for bat activity at the site, see Section 6.2.1 of the Bat Report (Appendix 6-2).</p> <p>In addition to this, ongoing monitoring of bat activity will be undertaken for at least 3 years’ post construction of the wind farm (as per NatureScot, 2021). This will provide data and information on the actual recorded impact of the wind turbines on the local bat</p>

	<p>populations. Full details of the proposed monitoring programme are provided in Section 6.2.2 of the Bat Report (Appendix 6-2), and includes static detector surveys, walked survey transects and corpse searching within the areas surrounding the turbines to record any bat fatalities resulting from collision.</p> <p>The results of post construction monitoring shall be utilised to assess changes in bat activity patterns post construction and to monitor the implementation of the mitigation strategy. The performance of the curtailment programme in terms of its ability to respond to the changes in bat abundance based on temperature and wind speed will be analysed to confirm the efficacy of the curtailment during different periods of bat activity. At the end of each year, the efficacy of the curtailment programme will be reviewed, and any identified efficiencies incorporated into the curtailment programme. This approach allows for an evidence-based review of the potential for bat fatalities at the site, post construction, to ensure that the necessary measures, based on a new baseline post-construction, are implemented for the protection of bat species locally.</p>
<p>Residual Effect following Mitigation</p>	<p>Following the implementation of the monitoring and mitigation described above, there is no potential for significant residual effects on bat species.</p>

6.7.5 Likely Significant Effects During Decommissioning phase

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

The impacts on biodiversity will also be similar in nature to those experienced during construction but on a far lesser scale and magnitude. There would be no additional or ancillary impacts associated with the decommissioning phase.

The wind turbines proposed as part of the Proposed Development are expected to have a lifespan of approximately 30 years. Following the end of their useful life, the equipment may be replaced with a new technology, subject to planning permission being obtained, or the Proposed Development may be decommissioned fully.

Upon decommissioning of the Proposed Development, the wind turbines will be disassembled in reverse order to how they were erected. The turbines will be disassembled with the same model of cranes that were used for their erection. The turbine will be removed from site using the same transport methodology adopted for delivery to site initially. The turbine materials will be transferred to a suitable authorised recycling or recovery facility.

All above ground turbine components would be separated and removed off-site for recycling. Turbine foundations would remain in place underground and would be covered with earth and reseeded as appropriate. Leaving the turbine foundations in-situ is considered a more environmentally prudent option, as to remove that volume of reinforced concrete from the ground could result in environment emissions such as noise, dust and/or vibration.

Site roadways will be left in situ, as appropriate. If it were to be confirmed that the roads were not required in the future for any other useful purpose, they could be dressed in soil or alternatively removed where required. A decommissioning plan will be agreed with the local authorities three months prior to decommissioning the Proposed Development.

The electrical cabling connecting the Proposed Development to the existing 110 kV substation will remain in situ under the ownership of ESB.

A Decommissioning Plan has been prepared (Appendix 4-10) the final details of which will be agreed with the local authority prior to any decommissioning. The Decommissioning Plan will be updated prior to the end of the operational period in line with decommissioning methodologies that may exist at the time and will be agreed with the competent authority at that time. The potential for effects during the decommissioning phase of the proposed renewable energy development has been fully assessed in the EIAR.

The existing site roads would be used during decommissioning. The redundant underground cables will be pulled from their trenches without the requirement for significant excavation.

The same mitigation to prevent significant impacts on water quality and associated aquatic fauna and other terrestrial fauna during construction will be applicable to the decommissioning phase. A decommissioning plan has been prepared and is included as Appendix 4-10 of this EIAR. The plan provides details of the methodologies that will be adopted, throughout decommissioning, the environmental controls that will be implemented, the Emergency Response Procedure to be adopted, methods for reviewing compliance and an indicative programme of decommissioning works. The CEMP for the Proposed Development also provides details of the mitigation and best practice that will be employed to avoid any potential for significant residual effects on biodiversity during decommissioning of the Proposed Development. In addition, the measures incorporated into the construction phase, in Section 6.7.3 of this EIAR, including specific mitigation provided in relation to water quality in Chapter 9: 'Water', will be implemented during decommissioning. It can be concluded that following the implementation of preventative mitigation, there is no potential for the decommissioning of the Proposed Development to result in significant effects on biodiversity.

6.8 Cumulative impact

The Proposed Development was considered in combination with other plans and projects in the area that could result in cumulative impacts on the Key Ecological Receptors (KERs) identified in Section 6.6.4 of this report, including European Sites, Nationally designated sites. This included a review of online Planning Registers and served to identify past and present plans and projects, their activities and their predicted environmental effects. The projects considered are listed in Chapter 2: Background of the Proposed Development.

6.8.1 Assessment of Plans

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

- > Roscommon County Development Plan 2022-2028
- > National Biodiversity Action Plan 2017-2021
- > Regional Spatial & Economic Strategy 2020-2032 (RSES)

The review focused on policies and objectives that relate to designated sites for nature conservation, biodiversity and protected species. Policies and objectives relating to the conservation of peatlands and sustainable land use were also reviewed, particularly where the policies relate to the preservation of surface water quality. An overview of the search results with regard to plans is provided in Table 6-22.

European sites are considered in the AA Screening Report and Natura Impact Statement that accompanies this application.

Table 6-23: Assessment of Plans

Plans	Key Policies and Objectives directly related to European Sites and Biodiversity in the Zone of Influence	Assessment of Potential Impact on Ecological Receptors and Designated Sites
<p>Roscommon County Development Plan 2022 - 2028</p>	<ul style="list-style-type: none"> ➤ Policy Objective NH 10.1: Ensure the protection, conservation and enhancement of the biodiversity of the county ➤ Policy Objective NH 10.2: Support the implementation of the relevant recommendations contained in the National Biodiversity Action Plan, including no net loss in biodiversity, and the All Ireland Pollinator Plan ➤ Policy Objective NH 10.3: Implement the County Roscommon Heritage Plan and the Biodiversity Action Plan, or any subsequent plans, in partnership with all relevant stakeholders. ➤ Policy Objective 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. ➤ Policy Objective NH 10.5: Ecological Impact Assessment (EcIA) will be required for Proposed Developments likely to significantly impact on natural habitats and/or species, and which are not subject to Environmental Impact Assessment ➤ Policy Objective 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 (e.g. through provision of swift boxes, bat roost sites, green roofs, etc.) having regard to the recommendations outlined in the Habitat Mapping in Co. Roscommon, 2011 and the County Roscommon Swift Survey, 2020 ➤ Policy Objective NH 10.7: Implement Article 6(3) and where necessary Article 6(4) of the Habitats Directive and to ensure that Appropriate Assessment is carried out in relation to works, plans and projects likely to impact on European sites (SACs and SPAs), whether directly or indirectly or in combination with any other plan(s) or project(s). All assessments must be in compliance with the European Communities (Birds and Natural Habitats) Regulations 2011 ➤ Policy Objective NH 10.8: Ensure that no plans, programmes, etc. or projects are permitted that give rise to significant cumulative, direct, indirect or secondary impacts on the integrity of European Sites arising from their size or scale, land take, proximity, resource requirements, emissions (disposal to land, water or air), transportation requirements, duration of construction, operation, decommissioning or from any other effects, (either individually or in combination with other plans, programmes, etc. or projects). 	<p>As above, the Development plan was comprehensively reviewed, with particular reference to Policies and Objectives that relate to the biodiversity, protected species and designated sites. A comprehensive Screening for Appropriate Assessment and Natura Impact Statement has been submitted along with this application.</p> <p>The Proposed Development has been designed in order to avoid loss of sensitive habitats where possible and where some loss has been identified; appropriate mitigation and enhancement measures have been incorporated into the Proposed Development through a Biodiversity Management and Enhancement Plan.</p> <p>The Proposed Development is located outside of any Nationally designated sites, as described in Section 6.5.1.1. and no significant residual effects have been identified in relation to sites of this nature.</p> <p>No potential for negative cumulative impacts when considered in conjunction with the current proposal were identified. No projects identified within the Development Plan were found to occur in the wider area surrounding the Proposed Development.</p>

Plans	Key Policies and Objectives directly related to European Sites and Biodiversity in the Zone of Influence	Assessment of Potential Impact on Ecological Receptors and Designated Sites
	<ul style="list-style-type: none"> ➤ Policy Objective NH 10.9: Ensure that any plan or project that could have a significant adverse impact (either alone or in combination with other plans and projects) upon the conservation objectives of any Natura 2000 Site or would result in the deterioration of any habitat or any species reliant on that habitat will not be permitted unless in exceptional circumstances. ➤ Policy Objective NH 10.10: Actively promote the conservation and protection of areas designated as an NHA (including proposed sites) and to only consider proposals for development within or affecting an NHA where it can be clearly demonstrated that the Proposed Development will not have a significant adverse effect on the NHA or pNHA. 	
<p>National Biodiversity Action Plan 2017-2021</p>	<p>Target 6.2 - Sufficiency, coherence, connectivity and resilience of the protected areas network substantially enhanced by 2020.</p>	<p>There will be no adverse effects on designated sites or biodiversity as a result of the Proposed Development.</p> <p>The Proposed Development will not impact on connectivity within the wider area and will maintain watercourses within and adjacent to the development site in good condition.</p>
<p>Regional Spatial and Economic Strategy 2020 - 2031</p> <p>https://www.nwra.ie/rses/</p>	<p>RPO 5.4 Encourage the prioritisation of Site-Specific Conservation Objectives (SSCO) for all sites of Conservation Value, designated in EU Directive (i.e. SACs, SPAs) to integrate with the development objectives of this Strategy.</p> <p>RPO 5.5 Ensure efficient and sustainable use of all our natural resources, including inland waterways, peatlands, and forests in a manner which ensures a healthy society a clean environment and there is no net contribution to biodiversity loss arising from development supported in this strategy. Conserve and protect designated areas and natural heritage areas. Conserve and protect European sites and their integrity.</p> <p>RPO 5.7 Ensure that all plans, projects and activities requiring consent arising from the RSES are subject to the relevant environmental assessment requirements including SEA, EIA and AA as appropriate.</p>	<p>There will be no adverse effects on biodiversity as a result of the Proposed Development, and no cumulative impacts in this regard.</p> <p>The Proposed Development has been designed to avoid any effects on water quality and/or designated sites outside the site.</p> <p>The Proposed Development has been subject to a full environmental assessment i.e. EIA and AA.</p>

6.8.2 Assessment of Projects

As described in Section 2.6, Chapter 2 of the EIAR, relevant projects have been assessed in combination with the Proposed Development and include planning applications in the vicinity of the site including other wind energy applications within a 20km zone of influence (see Section 2.3.2 and 2.6, Chapter 2). These have not been repeated here to reduce the duplication of information within this EIAR. However, they have been fully considered in the assessment with further detail provided below. In addition, Section 6.8.4 concludes on their potential for impact on biodiversity.

Other smaller developments within the application site, as fully described in Appendices 2.1 and 2.2 of this EIAR, have been considered within this cumulative impact assessment. In order to avoid repetition within the EIAR, these have not been repeated below.

6.8.2.1 Other Wind Farm Projects

For the purposes of this cumulative assessment wind farms within a 20-kilometre radius of the Proposed Development area have been considered in further detail below. Wind farms occurring at greater distances were considered, however, given the nature of the KERs identified within the EIAR survey area and that no significant residual effects were identified, further detailed analysis is not provided below:

- Skrine Wind Farm located approx. 8.5km to the north of the subject site, 2 turbines constructed
- Derrane Wind Farm located approx. 20km north of the subject site, Not yet constructed
- Kilcash Wind Farm located approx. 10.3km north of the subject site, currently under consideration by the An Bord Pleanála following refusal by Roscommon County Council

Skrine Wind Farm

Skrine Wind Farm is c. 8.5km from the Proposed Development site. The planning file for the development was reviewed on the Roscommon County Council Planning Register and no specific information regarding potential residual effects on ecological receptors was available. However, the following factors limit the potential for significant cumulative effects to result: the nature of the habitats on that site (as reviewed on publicly available aerial photography) and the relatively small-scale of the wind farm development, and the lack of significant residual impacts on biodiversity associated with the proposed Seven Hills Wind Farm when considered on its own.

No potential additive impacts have been identified which would result in the potential for significant cumulative effects with the Proposed Development. Taking into consideration also the fact that no significant residual effects on KERs have been identified for the proposed Seven Hills Wind Farm (post mitigation) significant cumulative effects on key ecological receptors are not anticipated.

Derrane Wind Farm

Derrane Wind Farm is c. 20km from the Proposed Development site. The planning file for the development was reviewed on the Roscommon County Council Planning Register and no specific information regarding potential residual effects on ecological receptors was available. However, the following factors limit the potential for significant cumulative effects to result: the nature of the habitats on that site (as reviewed on publicly available aerial photography), the distance from the Proposed Development site and the lack of significant residual impacts on biodiversity associated with the proposed Seven Hills Wind Farm when considered on its own.

No potential additive impacts have been identified which would result in the potential for significant cumulative effects with the Proposed Development. Taking into consideration also the fact that no significant residual effects on KERs have been identified for the proposed Seven Hills Wind Farm (post mitigation) significant cumulative effects on key ecological receptors are not anticipated.

Kilcash Wind Farm

Kilcash Wind Farm is c. 10.3km from the Proposed Development site. The planning file for the development was reviewed on the Roscommon County Council Planning Register and the Ecological Impact Assessment within the Environmental and Planning Report³³ was consulted. The report identifies a 'loss of a small area of improved grassland with some sections of the associated field boundary stone walls and access track', with no potential for deterioration in water quality identified. Based on the information available in this document, which concludes that 'the Proposed Development will have no adverse residual impact' on ecological receptors, significant cumulative impacts are not anticipated in combination with the proposed Seven Hills Wind Farm.

6.8.2.2 Non-Renewable Energy Developments

Appendix 2-1 of this EIAR lists non-renewable energy development existing and approved projects as well as planning applications pending a decision within approximately 2km of the proposed locations of turbines within the Proposed Development. Here a 2km distance from the proposed Wind Farm development has been considered for operational and construction purposes as an appropriate buffer to identify potential sensitive receptors and cumulative projects in the non-renewable energy category that should be considered in the context of the Proposed Development. This distance was considered to be proportional to the likely zone of influence of the developments listed below, which are relatively small-scale.

A review of all projects (existing and permitted) within 500 meters of the Grid Connection route has also been completed. The 500 meter distance from the Grid Connection route reflects a generous and conservative range in terms of identifying permissions which may have the potential for cumulative effects having regard to the nature of the Grid Connection works (i.e. construction and operation of underground cabling). Many of the noted applications relate to agricultural developments and/or single residential developments. Chapter 2 lists those existing and approved projects as well as planning applications pending a decision identified within 500 meters of the Grid Connection works.

The majority of non-renewable energy related planning applications in the immediate vicinity of the proposed Wind Farm site are related to the provision and/or alteration of one-off housing, retail, amenity and agricultural developments. Due the relatively small-scale nature of many of the above developments, the separation in distance, the absence of effects identified as a result of the Proposed Development and absence of in-combination impact pathways identified, the above developments do not represent any potential for in-combination impacts.

6.8.3 Existing Habitats and Land Uses

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

The Proposed Development is located primarily on improved or semi-improved agricultural grassland (GA1) habitats, which generally provide low value habitats for faunal species and some species rich calcareous grassland habitats of National and International importance. The loss of dry calcareous

³³ Rowan Engineering Consultants Ltd. (2021). *Environmental and Planning Report, Natural Forces Renewable Energy Ltd. April 2021: Proposed Wind Turbine Development, Kilcash, Co. Roscommon.*

grassland habitats, conforming to those listed in Annex I of the habitats directive (6210/6210*) that will be affected, will be fully mitigated through habitat enhancement and restoration proposed as part of this development. The Proposed Development will not contribute to any overall loss of high value habitat, it has been deliberately designed to be located on habitats of low value for faunal species.

6.8.4 Assessment of Cumulative Effects

The Proposed Development has been considered cumulatively with other plans and projects as described in Sections 6.8.1 & 6.8.2. Particular focus has been placed on those plans and projects that are in closest proximity to the Proposed Development and those that could be potentially affected via downstream surface water.

Following the detailed surveys undertaken and impact assessment provided in Section 6.7, it is concluded that there will be no significant residual habitat loss, disturbance, deterioration of water quality etc., associated with the Proposed Development and therefore it cannot contribute to any cumulative effect when considered in combination with other plans and projects. The other wind farms in the area were considered (among other projects) but the Proposed Development has been deliberately designed to minimise the effects on biodiversity through the siting of the Proposed Development on habitats of low ecological value. Following bespoke mitigation there will be no significant residual impacts on ecological receptors associated with the Proposed Development and therefore no potential for individual or cumulative negative effects on biodiversity.

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

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

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

6.9 Conclusion

The site is located within fields that mostly comprise improved agricultural grassland (GA1) of low ecological value with areas of dry calcareous and neutral grassland (GS1). A number of turloughs occur within the wider area, outside of the development footprint. Potentially significant effects on the Key Ecological Receptors identified in this report have been avoided through infrastructure siting, project design and mitigated by the implementation of specific mitigation measures as detailed in Section 6.7 of this chapter; including all references made to mitigation specified in Chapters 4 'Development Description', 9 'Water' and within the CEMP Appendix 4-9 of this EIAR.

Some areas classified as Calcareous grassland (GS1) habitat conform to the Annex I habitat [6210] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (*important orchid sites) priority habitat. These areas and associated habitats have been assessed as corresponding to those listed in Annex I of the EU Habitats Directive and were therefore identified as of County importance. The Proposed Development has been designed in order to avoid these priority habitats wherever possible and, where some loss has been identified and is unavoidable, appropriate mitigation, compensation and management measures have been incorporated into the Proposed Development through a Biodiversity Management and Enhancement Plan (see Appendix 6-5)

Faunal species records within the EIAR survey area, during detailed ecological surveys undertaken between 2019, 2020 and 2021, were found to be common and widespread in the wider area, and in a

National context. Protected species such as bats and badger were identified within the site boundary and bespoke avoidance and mitigation measures have been implemented to ensure that no significant effects will occur. In addition, a number of standard best practice and specially designed, bespoke mitigation measures have been incorporated into the project for the avoidance of impact on otter as a result of disturbance/displacement and water quality deterioration. The implementation of these measures in full will ensure compliance with the Wildlife Act.

Taking the above information into consideration and having regard to the precautionary principle, the Proposed Development will not result in a residual loss of any habitat of high ecological significance and will not have any significant impacts on the ecology of the wider area.

Provided that the Proposed Development is constructed, operated and decommissioned in accordance with the design, best practice and mitigation that is described within this application, significant effects on biodiversity are not anticipated at any geographic scale.