

7. BIODIVERSITY

7.1 Introduction

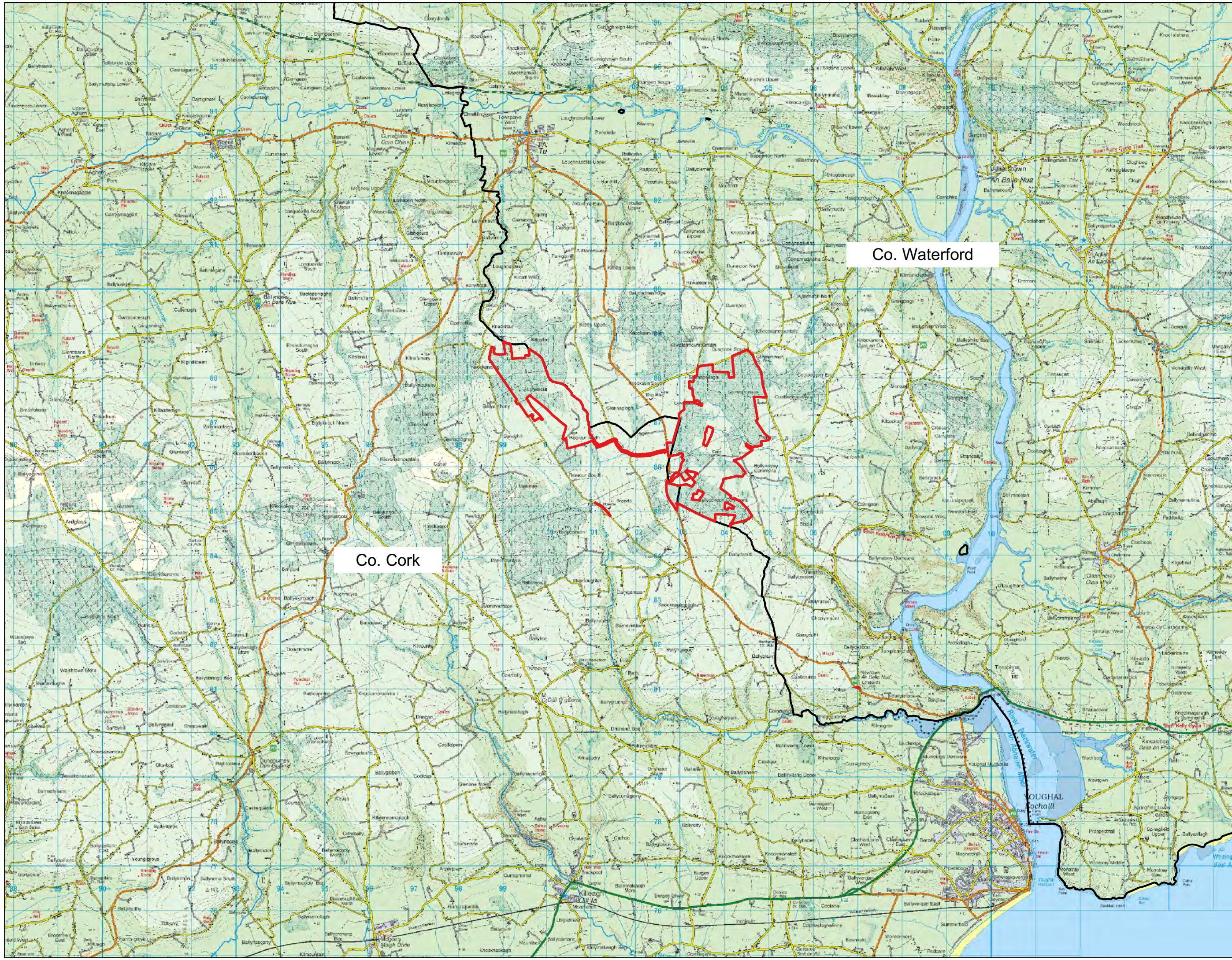
This chapter assesses the likely significant effects (both alone and cumulatively with other projects) that the proposed development may have on Biodiversity, Flora and Fauna and sets out the mitigation measures proposed to avoid, reduce or offset any potential significant effects that are identified. The residual impacts on biodiversity are then assessed. Particular attention has been paid to species and habitats of ecological importance. Impacts on avian receptors are considered in Chapter 8 of this EIAR. These include species and habitats with national and international protection under the Wildlife Acts 1976 to 2018 (as Amended), EU Habitats Directive 92/43/EEC. 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 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:

- For the purposes of this EIAR, the entire project is referred to as the ‘proposed development’.
- For the purpose of this EIAR, the term ‘EIAR Study Area Boundary’ refers to the site red line boundary, comprising the entire wind farm site and grid connection route as shown in Figure 7-1.
- “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

-  County Boundary
-  Site Boundary

Co. Waterford

Co. Cork



Site Location	
Project Title	
Lyrenacarriga Wind Farm	
Drawn By	Checked By
H. Witter	D. McNicholas
Project No.	Drawing No.
170749	Figure 7-1
Scale	Date
1:75000	2020-12-17

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

Requirements for Ecological Impact Assessment

National Legislation

The Wildlife Acts 1976-2012 as amended, is the principal piece of legislation governing protection of wildlife in Ireland. The Wildlife Act provides strict protection for species of conservation value. The Wildlife Act conserves wildlife (including game) and protects certain wild creatures and flora. These species are therefore considered in this report as ecological receptors. Natural Heritage Areas (NHAs) and Proposed Natural Heritage Areas (pNHAs) are heritage sites that are designated for the protection of flora, fauna, habitats and geological sites. Only NHAs are designated under the Wildlife (Amendment) Act 2017. These sites do not form part of the Natura 2000 network of European sites and the AA process, or screening for same does not apply to NHAs or pNHAs. Proposed Natural Heritage Areas (pNHAs) were published on a non-statutory basis in 1995 but have not since been statutorily proposed or 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. It is illegal to cut, pick, collect, uproot, 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;

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

- Integrate Natura 2000 and Biodiversity financial expenditure tracking into Government Programmes internal paying agency management procedures including linkage to the Prioritised Action Framework and this NBAP;
- Develop a Natural Capital Asset Register and national natural capital accounts by 2020, and integrate these accounts into economic policy and decision-making;
- Initiate natural capital accounting through sectoral and small-scale pilot studies, including the integration of environmental and economic statistics using the framework of the UN System of Experimental-Ecosystem Accounting (SEEA);
- Establish a national Business and Biodiversity Platform under the CBD’s Global Business Partnership;
- Ensure Origin Green produces tangible benefits for biodiversity with increased emphasis on conservation and restoration of biodiversity;
- Implement actions from Ireland’s Biodiversity Climate Change Sectoral Adaptation Plan;
- Identify and take measures to minimise the impact of incentives and subsidies on biodiversity loss, and develop positive incentive measures, where necessary, to assist the conservation of biodiversity;
- Establish and implement mechanisms for the payments of ecosystem services including carbon stocks, to generate increased revenue for biodiversity conservation and restoration;
- Develop and implement a National Biodiversity Finance Plan to set out in detail how the actions and targets of this NBAP will be delivered from 2017 and beyond; and
- Monitor the implementation of the Plan”

Such policies have informed the evaluation of ecological features recorded within the study area and the ecological assessment process.

European Legislation

The EU Habitats Directive (92/43/EEC) (together with the Birds Directive (79/409/EEC), as subsequently codified by Council Directive 2009/147/EC on the conservation of wild birds) forms the cornerstone of Europe’s nature conservation within the EU. It is built around two pillars: the Natura 2000 network of protected sites and the strict system of species protection. The Habitats Directive protects over 1,000 animal and plant species and over 200 "habitat types" (e.g. special types of forests, meadows, wetlands, etc.), which are of European importance. The Habitats Directive and Birds Directive, which were transposed into Irish law through Part XAB of the Planning and Development Acts 2000-2019 (from a land use planning perspective) recognise the significance of protecting rare and endangered species of flora and fauna, and more importantly, their habitats.

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

Council Directive 2009/147/EC on the conservation of wild birds (the “**Birds Directive**”) instructs Member States to take measures to maintain populations of all bird species naturally occurring in the wild state in the EU (Article 2). According to Recital 1 of the Birds Directive, Council Directive

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

In summary, the species and habitats provided National and International protection under these legislative and policy documents have been considered in this Ecological Impact Assessment. A detailed assessment of the likelihood of the proposed development having either a significant effect or an adverse impact on any relevant European Sites (i.e. cSACs², SPAs or cSPAs) has been carried out in the Appropriate Assessment Screening Report and Natura Impact Statement. A separate assessment has not been carried out in this chapter, to avoid duplication of assessments. However, the relevant conclusions have been cross-referenced and incorporated.

7.3 Relevant Guidance

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).
- SNH (2019) '*Bats and onshore wind turbines: survey, Assessment and mitigation*'
- Draft Revised guidelines on the information to be contained in Environmental Impact Statements (EPA, 2017).
- Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment. Department of the Environment, Community and Local Government DoEHLG (2013).
- Guidelines for assessment of Ecological Impacts of National Road Schemes, (NRA, 2009).
- Environmental Impact Assessment of National Road Schemes – A Practical Guide (NRA, 2009).
- Environmental Assessment and Construction Guidelines (NRA, 2006).
- Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (Environmental Protection Agency (EPA), 2003).
- Guidelines on the information to be contained in Environmental Impact Statements (EPA, 2002).
- European Commission Guidance on the preparation of the Environmental Impact Assessment Report (2017)
- Environmental Protection Agency (EPA) '*Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*' (August 2017)

² cSAC refers to an abbreviation of 'candidate' Special Area of Conservation. This is also relevant for Special Protection Areas.

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

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

- The International Convention on Wetlands of International Importance especially Waterfowl Habitat (Concluded at Ramsar, Iran on 2 February 1971)
- S.I. No. 272 of 2009: European Communities Environmental Objectives (Surface Waters) Regulations 2009 and S.I. No. 722 of 2003 European Communities (Water Policy) Regulations 2003 which give further effect to EU Water Framework Directive (2000/60/EC).

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

- Regulation 49 and 50 of European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477 of 2011).

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

- National Biodiversity Action Plan 2017-2021
- Cork County Development Plan 2014
- Waterford County Development Plan 2011-2017

7.3.1 Statement of Authority

Ecological baseline surveys, including bat surveys, were conducted by David McNicholas (B.Sc., M.Sc., MCIEEM), Julie O’Sullivan (B.Sc, M.Sc), Irene Sullivan (B.Sc.) and Luke Dodebier (BSc). Julie is an experienced ecologist with over 5 years professional experience. Irene is an ecologist experience in undertaking habitat and ecological assessments. Luke has over 2 years professional ecological experience. Bat surveys, data collection and bat survey design for the site were conducted by Pat Doherty (MSc, MCIEEM). Additional incidental species sightings were also recorded during dedicated bird surveys of the site between 2016 and 2018. These bird surveys were undertaken by Tony Nagle (MSc.), Alan McCarthy (BSc.) and Jack Kennedy (BSc.).

This EIAR chapter has been prepared by David McNicholas (B.Sc., M.Sc., MCIEEM) and reviewed by John Hynes (B.Sc., M.Sc., MCIEEM). David is an experienced ecologist with over 10 years professional experience and is a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM). John is an experienced ecologist who has over 10 years’ professional experience in environmental management and ecological assessment.

7.4 Methodology

The following sections describe the methodologies followed to establish the baseline ecological condition of the proposed development site and surrounding area. Assessing the impacts of any project and associated activities requires an understanding of the ecological baseline conditions prior to the project proceeding. Ecological Baseline conditions are those existing in the absence of proposed activities (CIEEM, 2018³).

³ CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester.

7.4.1 Desk Study

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

- Review of online web-mappers: National Parks and Wildlife Service (NPWS), EPA (Envision), Water Framework Directive (WFD) and Inland Fisheries Ireland (IFI).
- Data on potential occurrence of protected bryophytes – as per NPWS online map viewer; Flora Protection Order Map Viewer – Bryophytes⁴.
- Review of the Bat Conservation Ireland (BCI) Private Database
- Review of the publicly available National Biodiversity Data Centre (NBDC) web-mapper
- Inland Fisheries Ireland (IFI) Reports, where available.
- Records from the NPWS web-mapper and review of specially requested records from the NPWS Rare and Protected Species Database for the hectad in which the Proposed development is located.
- Review of existing reports and assessments in relation to the current project

7.4.2 Scoping and Consultation

MKO undertook a scoping exercise during preparation of this EIAR, as described in Chapter 2, Section 2.9 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 7-3 provides a list of the organisations consulted with regard to biodiversity during the scoping process, and notes where scoping responses were received.

Table 7-3 Organisations consulted with regard to biodiversity

Consultee	Key Scoping Response Points	Addressed in EIAR
Department of Agriculture, Food and the Marine (DAFM)	If the proposed development will involve the felling or removal of any trees, the developer must obtain a Felling License from this Department before trees are felled or removed.	Chapter 10 'Water' - Section 10.5.2.1. Section 7.6.4.1
An Taisce	No response received to date	NA
Bat Conservation Ireland	No response received to date	NA
Birdwatch Ireland	No response received to date	NA
Department of Communications, Climate Action and the Environment	No response received to date	NA

⁴ 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: 26/10/2020.

Department of Culture, Heritage and the Gaeltacht	Response no. 3 - The DAU have requested that effects of the following are assessed: Overhead powerlines or electricity cables crossing the Blackwater River or its tributaries or the Blackwater Estuary, geotechnical risk assessment where deep peat soils are to be excavated, performances of the mitigation measures, a survey for the occurrence of otter and kingfisher, baseline of survey of bats, ecological survey of the broadleaf parts of the woodlands, a survey (2 years) for breeding and wintering bird use.	Sections 7.5.2, 7.6.4.1, 7.6.4.2 & 7.6.5.
Inland Fisheries Ireland	A number of issues have the potential to impact catchment areas of the Glenaboy River, River Bride, River Tourig and other minor tributaries. The issues include physical interference with stream channels, prevention of discharges of polluting matter such as cement, prevention of silt deposition in streams, hardcore areas and roads, stream crossings and storage of fuels/oils etc - to be addressed in assessment.	Sections 7.6.4.1.1, 7.5.2, 7.6.4.1, 7.6.4.2 & 7.6.5.
Irish Peatland Conservation Council	- No response received to date	NA
Irish Red Grouse Association	- No response received to date	NA

7.4.3 Field Surveys

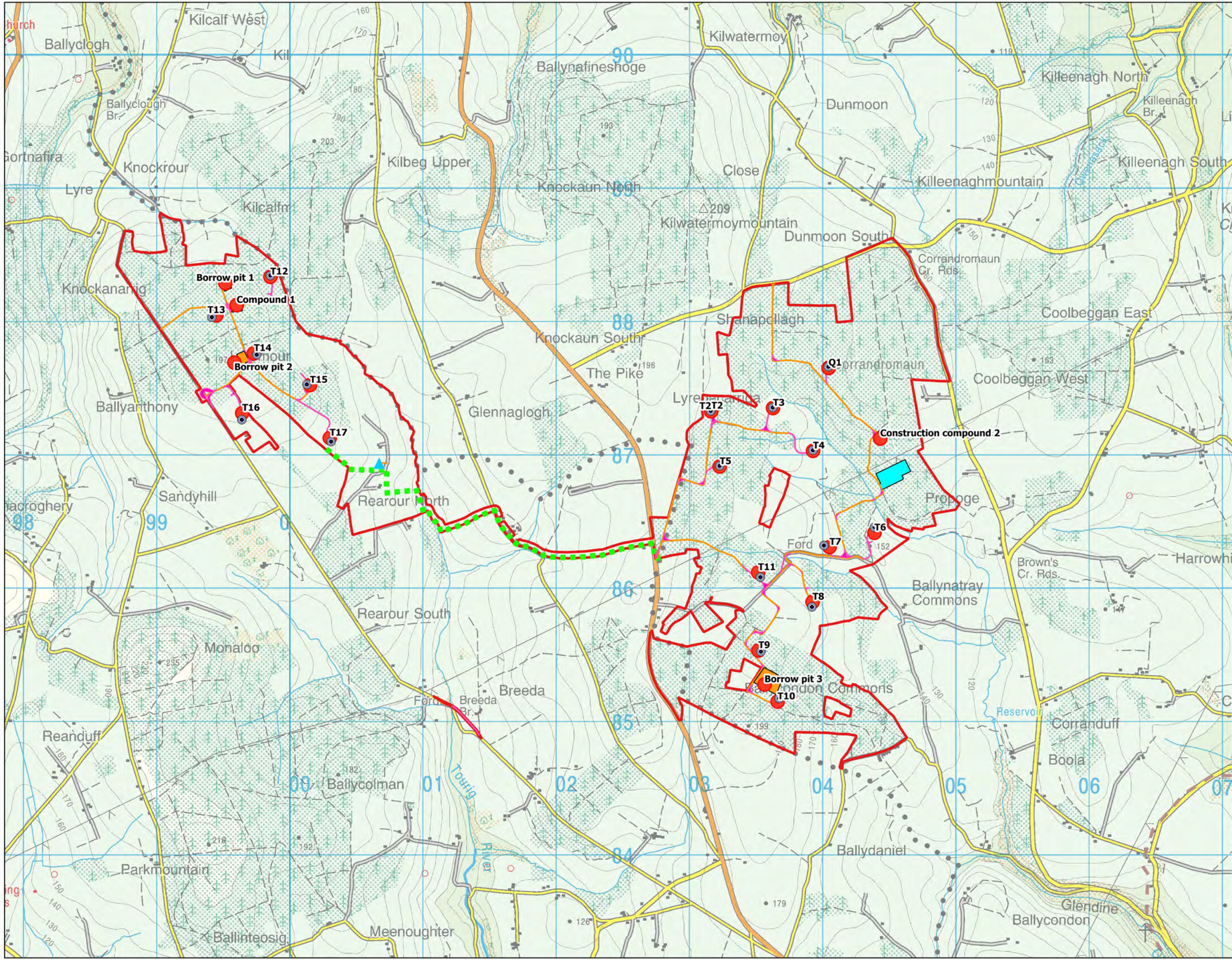
A comprehensive survey of the biodiversity of the entire site was undertaken on various dates between 2018 and 2020 (as well as incidental records during bird surveys between 2016-18). The following sections fully describe the ecological surveys that have been undertaken and provide details of the methodologies, dates of survey and guidance followed.

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

Prior to the commencement of multidisciplinary walkover surveys of the proposed site, the habitats within the site were mapped using aerial photographs.

Multidisciplinary ecological walkover surveys were undertaken on the 31st August 2018, 05th October 2018, 26th of September 2019, 29th May 2020 and 19th November 2020. Additional incidental species sightings were also recorded during dedicated bird surveys of the site between 2016 and 2018. The site was systematically and thoroughly walked in a ground-truthing exercise with the habitats on the proposed site assessed, classified and sketched onto field maps. 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 location of all quadrats is provided in Figure 7-2.

The walkover surveys were also designed to detect the presence, or likely presence, of a range of protected species. The survey included a search for badger setts and areas of suitable habitat, potential features likely to be of significance to bats and additional habitat features for the full range of other protected species that are likely to occur in the vicinity of the Proposed 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.



- Map Legend**
- Site Boundary
 - Proposed 110kV Substation
 - Proposed Turbine
 - ▲ Proposed Met Mast
 - Proposed Borrow Pit
 - Collector Cabling Route
 - Proposed Compound
 - Proposed New Road
 - Existing Road Proposed for Upgrade
 - Quadrat locations

Quadrat Locations

Project Title	
Lyrenacarriga Wind Farm	
Drawn By	Checked By
H Witter	D McNicholas
Project No.	Drawing No.
170749	Figure 7-2
Scale	Date
1:25000	2020.11.06

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

Ordnance Survey Ireland Licence No. AR 0021820 © Ordnance Survey Ireland/Government of Ireland

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

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

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

7.4.3.2 Dedicated Habitat and Vegetation Composition Surveys

The walkover surveys were undertaken in order to ground truth the habitats within the proposed development site. Detailed habitat classification and assessment was undertaken by MKO at targeted locations within the development footprint, with relevés undertaken within representative habitats at each turbine base, substation, borrow pits etc. 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.

All habitats recorded on site and described in this EIAR chapter have been classified in accordance with Fossitt (2000). In addition, grassland habitats outside of the Proposed Development but within the study area are described in detail in this chapter. Full details of all the botanical surveys and results are provided in Appendix 7.1.

Botanical surveys for all turbine, road infrastructure, sub stations, grid connections and all other infrastructure were undertaken.

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:

- Perrin, P.M, Martin, J.R., Barron, J.R., Roche & O’Hanrahan, B. (2014) *Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland*. Version 2.0. Irish Wildlife Manuals, No. 79. National Parks and Wildlife Service.
- Cross, J. & Lynn, D. (2013) *Results of a monitoring survey of bog woodland*. Irish Wildlife Manuals, No. 69. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
- Fernandez, F., Connolly K., Crowley W., Denyer J., Duff K. & Smith G. (2014) *Raised Bog Monitoring and Assessment Survey 2013*. Irish Wildlife Manuals, No. 81. National Parks and Wildlife Service, Department of Arts, Heritage and Gaeltacht, Dublin, Ireland.
- Commission of the European Communities (2013) *Interpretation manual of European Union habitats*. Eur 27. European Commission DG Environment.
- NPWS (2013) *The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.1*. Unpublished Report, National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
- 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.

- O'Neill, F.H. & Barron, S.J. (2013) Results of monitoring survey of old sessile oak woods and alluvial forests. Irish Wildlife Manuals, No. 71. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

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).

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).

7.4.3.3 Terrestrial Fauna Surveys

The results of the desk study, scoping replies, incidental records of protected species recorded 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, records of invertebrates including butterflies, damselflies, dragonflies, moths, beetles etc. were recorded.

7.4.3.3.1 Badger Survey

Areas identified as providing potential habitat for badger were subject to specialist targeted survey on 31st August 2018, 05th October 2018, 26th of September 2019, 29th May 2020 and 19th November 2020.

The badger surveys covered the entire development footprint and surrounding suitable habitats in the study area. 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 Proposed Development. This involved a search for all potential badger signs as per NRA (2009) (latrines, badger paths and setts). If encountered, setts were classified as per the convention set out in NRA (2009) (i.e. main, annexe, subsidiary, outlier).

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

7.4.3.3.2 Otter Survey

Areas identified as providing potential habitat for otter, i.e. watercourses within and near the site, were subject to specialist targeted survey. Potential habitat for otter was noted and a dedicated otter survey of watercourses was conducted on 31st August 2018, 05th October 2018, 26th of September 2019, 29th May 2020 and 19th November 2020.

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)

⁵ CIEEM, 2013, Technical Guidance Series – Competencies for Species Survey, Online, Available at: <https://cieem.net/resource/competencies-for-species-survey-css/> Accessed: 20.12.2019

‘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).

7.4.3.3.3 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 by MKO on the 08th August 2018 and 26th of September 2019. 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. When webs were located, the grid reference of each web was recorded and mapped. This allowed for an accurate estimate of the population size and distribution within the study area. 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 National Biodiversity Data Centre (NBDC)⁷. 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. Due to the occasionally ephemeral nature of their sub-populations, two successive years of surveys were undertaken within the EIAR study area (2018 & 2019).

7.4.3.3.4 Bat Surveys

Bat surveys, survey design and all other data collection were solely designed and conducted by Pat Doherty MSc, MCIEEM. Bat surveys were undertaken at the study area during 2017-2019. Monitoring was completed using Wildlife Acoustics SM2BAT+ and SM4BAT FS and SM4BAT ZC bioacoustic recorders.

Static detectors were set to record from 30 minutes before sunset until 30 minutes after sunrise. All manual activity surveys were undertaken using a Peterson’s D230 (heterodyne and frequency division). Other equipment used during the survey included a high-powered torch, an inspection camera and binoculars. The assessment and mitigation provided in the standalone bat survey report is in accordance with SNH 2019 Guidance (Appendix 7.2.).

7.4.3.3.5 Squirrel Surveys

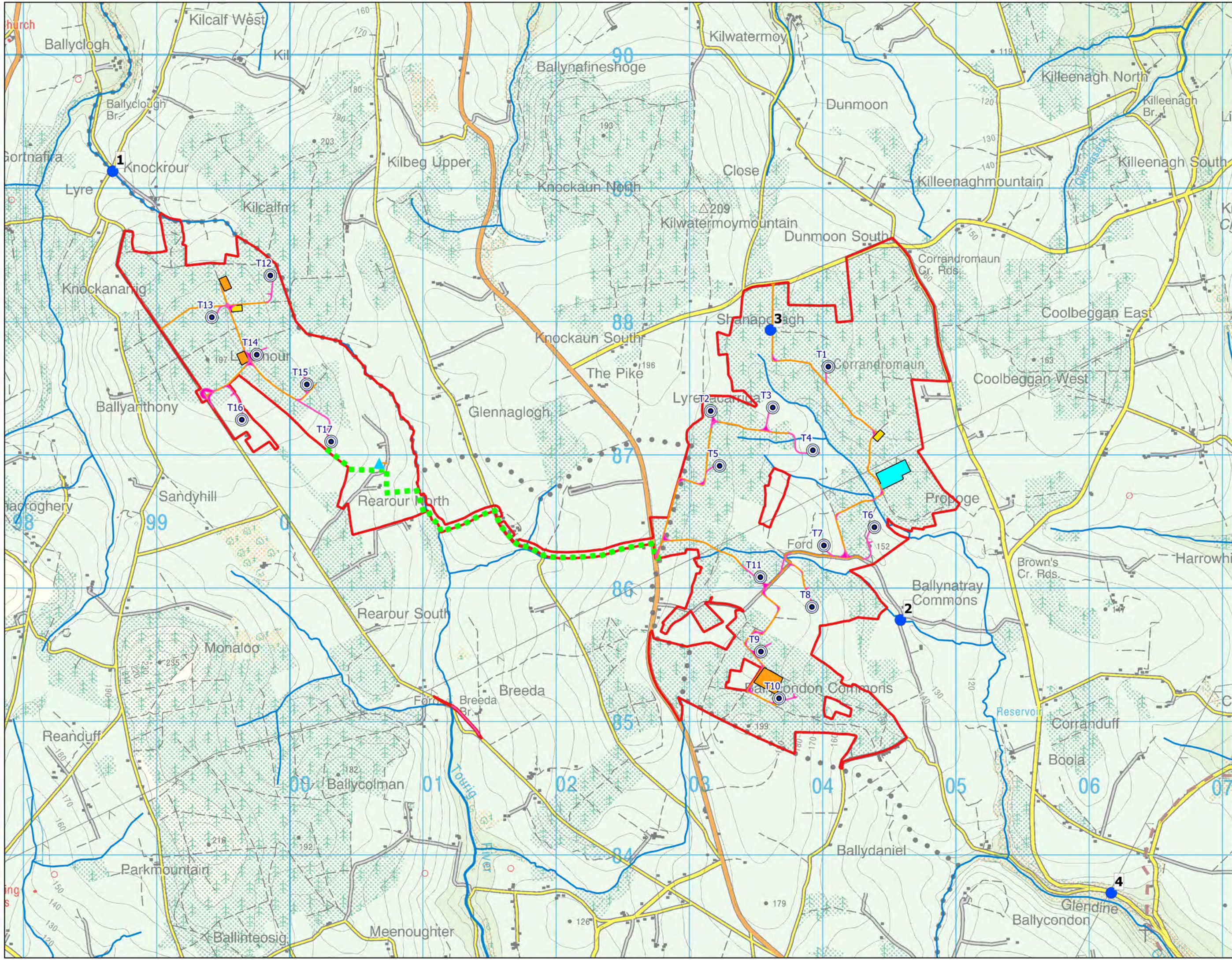
Dedicated squirrel surveys were undertaken within areas of suitable habitat (coniferous plantation forestry) occurring within and near the proposed infrastructure. Areas of conifer plantation in particular, occurring within the development site, were searched for signs of squirrel activity.

7.4.3.4 Aquatic surveys

Kick sampling was carried at watercourses both within and downstream of the proposed development site in order to inform baseline conditions. These were carried out on the 26th of September 2019. Representative locations along watercourses that drain the site were chosen for the assessment. The locations of each watercourse surveyed are provided in Figure 7-3.

⁶ CIEEM, 2013, *Technical Guidance Series – Competencies for Species Survey*, Online, Available at: <https://cieem.net/resource/competencies-for-species-survey-css/> Accessed: 20.12.2020

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, 20.12.2020



- Map Legend**
- Site Boundary
 - Proposed 110kV Substation
 - Proposed Turbine
 - ▲ Proposed Met Mast
 - Proposed Borrow Pit
 - Collector Cabling Route
 - Proposed Compound
 - Proposed New Road
 - Existing Road Proposed for Upgrade
 - Kick Sample Locations
 - EPA Mapped Watercourses

Drawing Title

Kick Sample Locations

Project Title

Lyrenacarriga Wind Farm

Drawn By H Witter	Checked By D McNicholas
Project No. 170749	Drawing No. Figure 7-3
Scale 1:25000	Date 2020.11.06

MKO
Planning and
Environmental
Consultants

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

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 10870:2012). Large cobble was also washed at each site where present. The results of the surveys are provided in Appendix 7-3.

7.4.3.5 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) (S.I. 477 of 2015).

7.4.3.6 Survey limitations

Seasonal factors that affect distribution patterns and habits of species were taken into account when conducting the surveys. The survey timings were spread out and designed to cover all seasonal/other timing constraints.

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

7.4.4 Methodology for Assessment of Impacts and Effects

7.4.4.1 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 31st August 2018, 05th October 2018, 26th of September 2019 and 29th May 2020, not including bird and 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 1976-2019
- Species protected under the Flora Protection Order 2015

7.4.4.2 Determining Importance of Ecological Receptors

The importance of the ecological features identified within the study area was determined with reference to a defined geographical context. This was undertaken following a methodology that is set out in Chapter 3 of the ‘Guidelines for Assessment of Ecological Impacts of National Roads Schemes’

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.

(NRA, 2009). These guidelines set out the context for the determination of value on a geographic basis with a hierarchy assigned in relation to the importance of any particular receptor. The guidelines provide a basis for determination of whether any particular receptor is of importance on the following scales:

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

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

Any ecological receptors that are determined to be of National or International, County or Local importance (Higher Value) following the criteria set out in NRA (2009) are considered to be 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.

7.4.4.3 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 2017). 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 or 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 a reasonable timescale can vary between receptors and is justified where appropriate in the impact assessment section of this report.

7.4.4.4 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 (EclA), ‘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 draft Guidelines on information to be included in Environmental Impact Assessment Reports (EPA, 2017) 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 Draft EPA Guidelines (2017) as shown in Table 7.4.

Table 7-4 Criteria for determining significance of effect, based on (EPA, 2017) 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 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 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 methodologies, 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).

7.4.4.5 Incorporation of Mitigation

Section 7.5 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 is incorporated into the project design or layout to address such impacts. The implemented mitigation measures avoid or reduce or offset potential significant residual effects, post mitigation.

7.5 Establishing the Ecological Baseline

7.5.1 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.

7.5.1.1 Designated Sites

7.5.1.1.1 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.

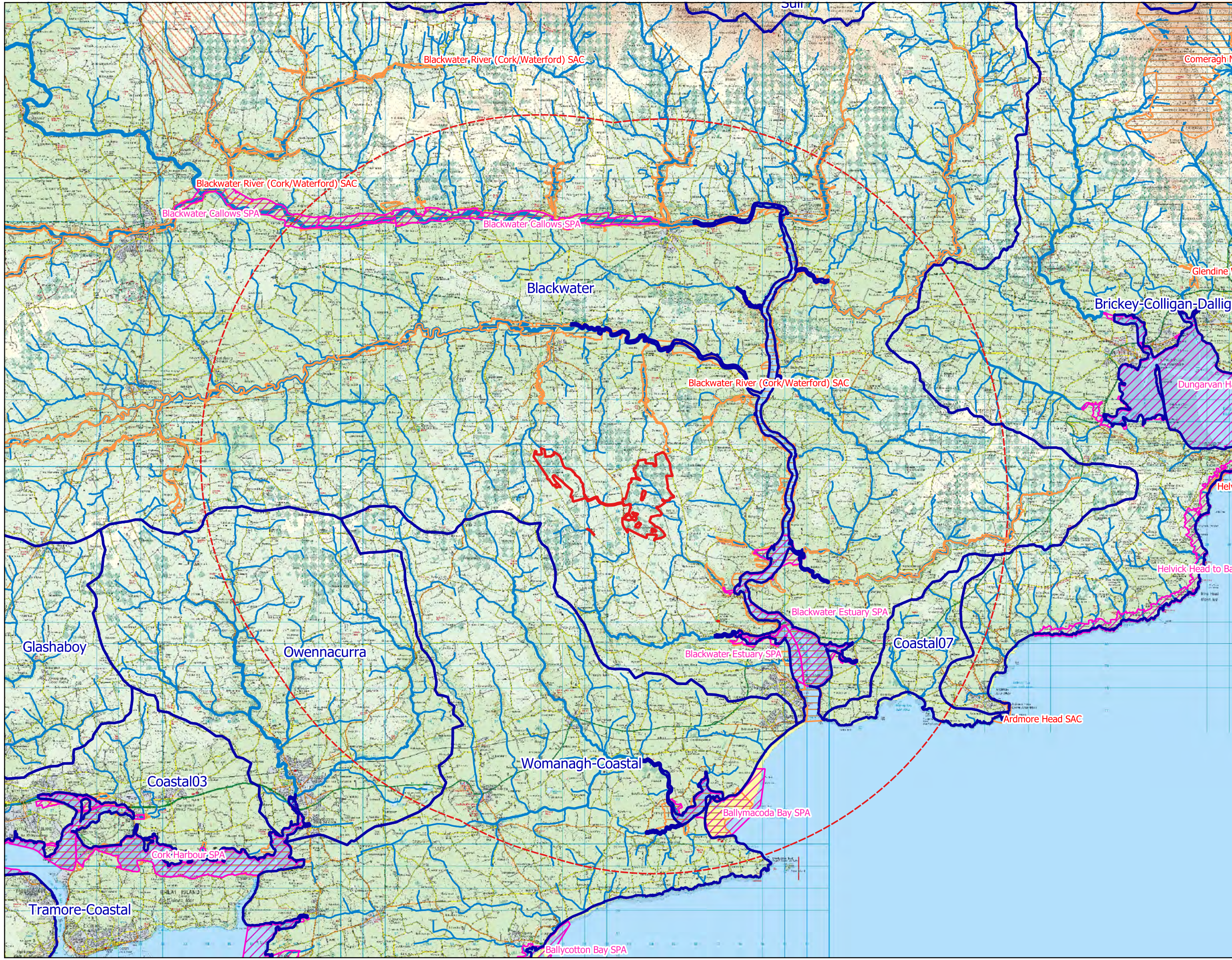
Special Areas of Conservation (SACs) and Special Protection Areas for Birds (SPAs) are designated under the EU Habitats Directive and EU Birds Directive, respectively and are collectively known as ‘European Sites’. The potential for significant effects and/or adverse impacts on the integrity of European Sites is fully assessed in the AA Screening Report and Natura Impact Statement that accompanies this application. As per EPA 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”. Section 7.6.2 of this EIAR provides a summary of the key assessment findings with regard to European Designated Sites.

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

The following methodology was used to establish which sites 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 19/11/2020. The datasets were utilised to identify Designated Sites which could feasibly be affected by the proposed development.
- All designated sites within a distance of 15km surrounding the development site were identified. In addition, the potential for connectivity with European or Nationally designated sites at distances of greater than 15km from the proposed development was also considered in this initial assessment.
- A map of all the European Sites within 15km is provided in Figure 7-4 with all Nationally designated sites shown in Figure 7-5.



Map Legend

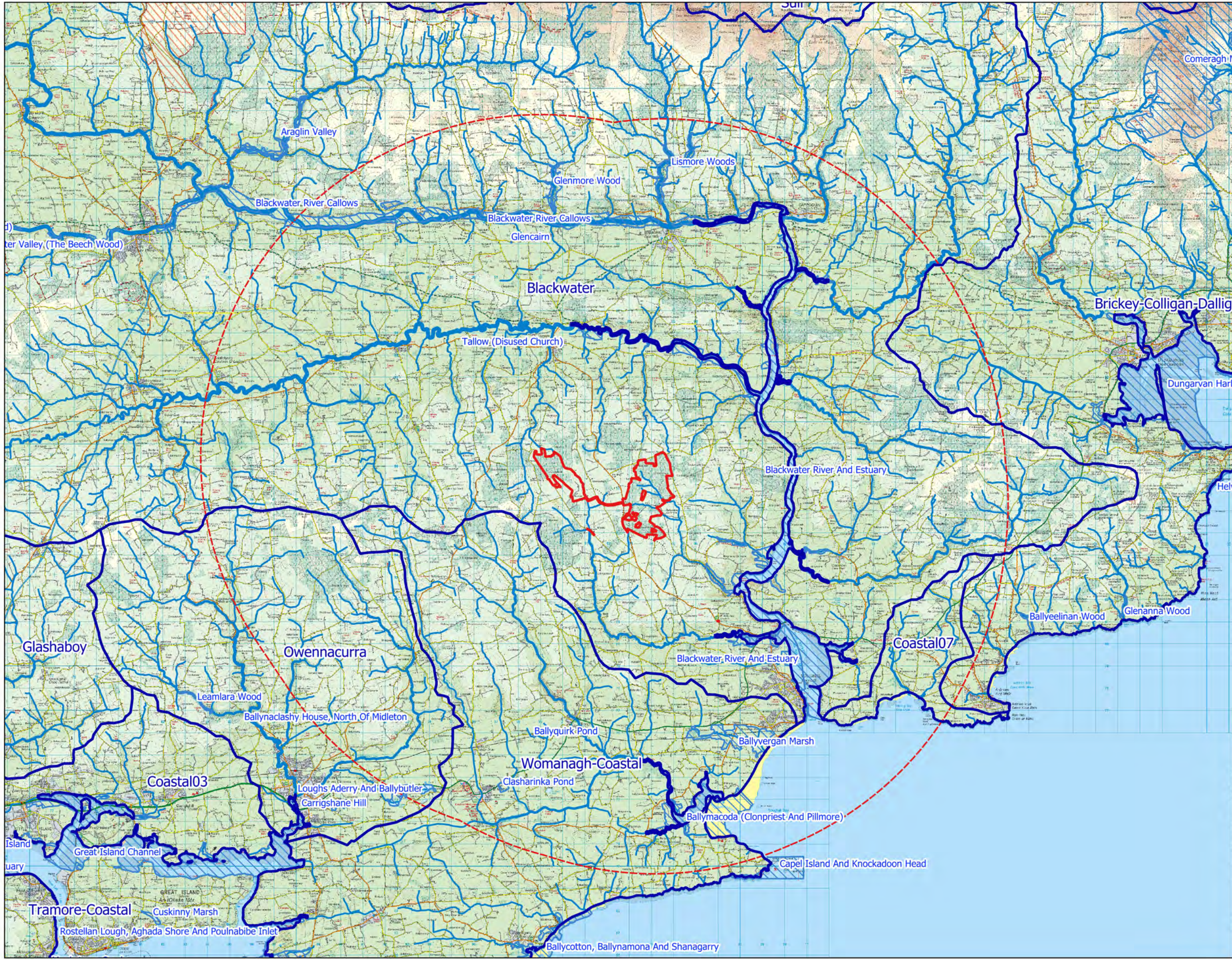
- 15km Site Buffer
- Site Boundary
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)
- EPA Mapped Watercourses
- EPA Catchments

Ordnance Survey Ireland Licence No. AR 00218200 © Ordnance Survey Ireland/Government of Ireland



Drawing Title	
EU Designated Sites	
Project Title	
Lyrenacarriga Wind Farm	
Drawn By	Checked By
H. Witter	D. McNicholas
Project No.	Drawing No.
170749	Figure 7-4
Scale	Date
1:150000	2021-01-05

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

- Site Boundary
- 15km Site Buffer
- Natural Heritage Areas (NHA)
- Provisional Natural Heritage Areas (pNHA)
- EPA Catchments
- EPA Mapped Watercourses

Ordnance Survey Ireland Licence No. AR 0021820 © Ordnance Survey Ireland / Government of Ireland



Nationally Designated Sites	
Project Title	
Lyrenacarriga Wind Farm	
Drawn By	Checked By
H. Witter	D. McNicholas
Project No.	Drawing No.
170749	Figure 7-5
Scale	Date
1:150000	2021-01-05

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

- Table 7-5 provides details of all relevant Nationally designated sites as identified in the preceding steps and assesses which are within the likely Zone of Impact. All European Designated Sites are fully described and assessed in the Screening for Appropriate Assessment and Natura Impact Statement reports submitted as part of this planning application.
- The designation features of these sites, as per the NPWS website (www.npws.ie), were consulted and reviewed at the time of preparing this report 19/11/2020.

Table 7-5 Identification of Nationally designated sites within the Likely Zone of Impact

Designated Site	Distance from Proposed Development (km)	Zone of Likely Impact Determination
Proposed Natural Heritage Areas (pNHA)		
Blackwater River and Estuary (000072)	2.1km east of development site	In the absence of mitigation, the proposed development has the potential to cause deterioration in surface water quality during the construction, operational and decommissioning phases, potentially affecting downstream aquatic receptors. This pNHA is therefore within the likely zone of impact, and further assessment was deemed to be required and has been carried out as part of this EIAR.
Tallow (Disused Church) (000670)	3.6km north-west of development site	Given the separation in distance between the site of the proposed development and the pNHA, no potential pathway for impact has been identified and no further assessment is required.
Ballyvergan Marsh (000078)	8.5km south-east of development site	There is no potential for direct effects as the proposed development is located entirely outside of this designated site. No pathway for indirect effects on pNHA has been designated exists. No direct or indirect hydrological connectivity has been identified between the proposed development site and the pNHA. This pNHA is therefore not within the Likely Zone of Impact.
Blackwater River Callows (000073)	8.5km north-west of development site	There is no potential for direct effects as the proposed development is located entirely outside of this designated site. No pathway for indirect effects
Glencaim (002095)	8.6km south-west of development site	

Designated Site	Distance from Proposed Development (km)	Zone of Likely Impact Determination
Glenmore Wood (001933)	9.4km north of development site	on pNHA has been designated exists. No direct or indirect hydrological connectivity has been identified between the proposed development site and the pNHA. This pNHA is therefore not within the Likely Zone of Impact.
Lismore Woods (000667)	9.9km north of development site	
Ballyquirk Pond (001235)	10.0km south of development site	
Ballymacoda (Clonpriest And Pillmore) (000077)	10.7km south-west of development site	
Clasharinka Pond (001183)	12.5km south-west of development site	
Loughs Aderry and Ballybutler (000446)	14.0km south-west of development site	
Natural Heritage Area (NHA)		
There are no NHAs within 15km buffer zone of the proposed development site		N/A

Tributaries of the River Bride which forms part of the Blackwater River and Estuary pNHA (000072) flows through the north-eastern part of the site. River Glenaboy flows out of the western extent of the site into the River Bride and enters the pNHA in excess of 9.2km surface water distance downstream. On this basis, this site is considered to be within the likely impact zone of the proposed development. The Blackwater River and Estuary pNHA (000072) is also designated as a Special Area of Conservation specifically the Blackwater River (Cork/Waterford) SAC. Therefore, impacts on this designated site are fully considered under the European designation within the NIS. This is further described in Section 7.6.2 of this Chapter. There is no pathway for connectivity between the proposed development and any other pNHAs.

The AA Screening report that accompanies this application identifies the following European Sites as being within the Likely Zone of Impact:

- Blackwater River (Cork/Waterford) SAC (900m from the proposed development site)
- Blackwater Estuary SPA (3.5km from the proposed development site).

7.5.1.2 NPWS Article 17 Reporting

A review of the Irish Reports for Article 17 of the Habitats Directive (92/42/EEC) including Irish Semi-natural Grassland Survey datasets, National Survey of Native Woodlands, Long Established Woodland and National Uplands Survey datasets was conducted prior to undertaking the multi-disciplinary walkover survey. Datasets were also consulted in September 2020 to determine if there have been any amendments.

Datasets were downloaded and overlain on the proposed development site. The Article 17 GIS polygon datasets for Wet heath [4010], Dry heath [4030], Blanket bog [7130] and Alluvial woodland [91E0] do not contain records for the site or the surrounding area. The nearest Old sessile oak woodland [91A0] was mapped 1.5km north-east of Cluster 1 and approximately 2km south-east of Cluster 2. The nearest records of ancient or long-established woodland was mapped 1.5km north-east of Cluster 1. There were no Annex I grassland habitats mapped within or adjacent to the proposed development site. A review of the Irish Semi-natural Grassland Survey datasets identified a small area of Improved Agricultural grassland (GA1)

and Wet grassland (GS4) within and adjacent to the south-east boundary of Cluster 2 and these were identified as conforming to Annex I grassland habitat.

7.5.1.3 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 study site is situated (W98 and X08). Species of conservation concern are given in Table 7-6. No species listed in Annex II of the Habitats Directive or the Flora (Protection) Order are shown in the atlas for squares W98 and 08.

Table 7-6 Species listed designated under the Flora Protection Order or the Irish Red Data Book within Hectad W98 and X08.

Common Name	Scientific Name	Hectad	Status
Glebionis segetum	<i>Chrysanthemum segetum</i>	W98	NT
Toadflax	<i>Linaria vulgaris</i>	W98	NT
Stag's-horn Clubmoss	<i>Lycopodium clavatum</i>	W98	NT
Common Cudweed	<i>Filago vulgaris</i>	W98	VU
Killarney Fern	<i>Trichomanes speciosum</i> (sporophyte)	X08	FPO, Annex II
Fragrant Agrimony	<i>Agrimonia procera</i>	X08	NT
Greater broomrape	<i>Orobanche rapum-genistae</i>	X08	NT

Near Threatened (NT), Vulnerable (VU), Critically Endangered (CR), Regionally Extinct (RE)

7.5.1.4 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, 2020⁹).

7.5.1.5 National Biodiversity Data Centre (NBDC) Records

A search of the National Biodiversity Data Centre (NBDC) website was conducted on the 20th November 2020. This helped to inform survey effort and provide a baseline of likely species composition in the area. Records of protected fauna recorded from hectads W98 and X08 are provided in Table 7.7.

Table 7-7 NBDC records for species of conservation interest in hectads W98 and X08

Common name	Scientific name	Designation	Hectad
Marsh fritillary	<i>Euphydryas aurinia</i>	HD Annex II	X08
Common frog	<i>Rana temporaria</i>	HD Annex V, WA	W98, X08
Brown long-eared bat	<i>Plecotus auratus</i>	HD Annex IV, WA	X08

⁹ NPWS, 2020. Online Map viewer – Bryophytes
<http://dahg.maps.arcgis.com/apps/webappviewer/index.html?id=71f8df33693f48edbb70369d7fb26b7e>

Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>	HD Annex IV, WA	X08
Otter	<i>Lutra lutra</i>	HD Annex II, IV, WA	W98, X08
Pine marten	<i>Martes martes</i>	HD Annex V, WA	X08
Badger	<i>Meles meles</i>	WA	W98, X08
Red squirrel	<i>Sciurus vulgaris</i>	WA	W98, X08
Fallow Deer	<i>Dama dama</i>	WA	W98, X08
West European Hedgehog	<i>Erinaceus europaeus</i>	WA	W98, X08
Common Seal	<i>Phoca vitulina</i>	HD Annex V, WA	X08
Common Lizard	<i>Zootoca vivipara</i>	WA	X08
Eurasian Pygmy Shrew	<i>Sorex minutus</i>	WA	X08

HD = EU Habitats Directive; WA = Wildlife Acts (Ireland).

7.5.1.6 Bat Records

The National Bat Database of Ireland was searched for records of bat activity and roosts within a 10 km radius of a central point within the proposed site boundary (Grid Ref: E201738 N086395, last search 21/07/2020). At least seven of Ireland’s nine resident bat species were recorded including Soprano pipistrelle and Brown long eared bat. The results of the database search are provided below in Table 7-8.

Table 7-8 National Bat Database of Ireland records within 10km

Record Type	Species	Location/Grid Reference	Date	Dataset
Roost	<i>Plecotus auritus</i>	X0983 Near Youghal Bridge and Clashmore; Co. Waterford	Unknown	Unknown
Roost	<i>Pipistrellus pipistrellus</i> (45kHz); <i>Plecotus auritus</i>	X1078 Youghal; Co. Waterford	Unknown	Unknown
Transects	<i>Myotis daubentonii</i> ; <i>Myotis nattereri</i> ; <i>Pipistrellus nathusii</i> ; <i>Unidentified bat</i>	Start point W9980094400	Unknown	Unknown
Ad-hoc observations	<i>Pipistrellus pygmaeus</i>	X0474185121	09/07/2008	BATLAS 2010
Ad-hoc observations	<i>Nyctalus leisleri</i> ; <i>Pipistrellus pipistrellus</i> (45kHz); <i>Pipistrellus pygmaeus</i>	X0474876992	09/07/2008	BATLAS 2010
Ad-hoc observations	<i>Myotis daubentonii</i>	X0859595172	09/07/2008	BATLAS 2010
Ad-hoc observations	<i>Myotis daubentonii</i>	X0495579991	09/07/2008	BATLAS 2010

7.5.1.7 NPWS

National Parks and Wildlife Service (NPWS) online records were searched to determine if any rare or protected species of flora or fauna have been recorded from hectads W98 and X08. An information request was also sent to the NPWS scientific data unit requesting records from the Rare and Protected Species Database in 2019 with an update requested on the 30th October 2020. An initial response was received on the 19th February 2019. Table 7-9 lists rare and protected species records

obtained from NPWS for a 5km radius from the site boundary located within hectads W98, W99, X08 and X09.

Table 7-9 NPWS records for rare and protected species

Common name	Scientific name	Designation
Greater broomrape	<i>Orobanche rapum-genistae</i>	RL (Near Threatened)
Killarney fern	<i>Trichomanes speciosum</i>	FPO
Tufted feather-moss	<i>Scleropodium cespitans</i>	RL (NT)
Greater broomrape	<i>Orobanche rapum-genistae</i>	RL (NT)
Dumortier's liverwort	<i>Dumortiera hirsuta</i>	RL (NT)
Spruce's bristle-moss	<i>Orthotrichum sprucei</i>	FPO
Sharp-leaved fluellen	<i>Kickxia elatine</i>	RL (VU)
Round-leaved crane's-bill	<i>Geranium rotundifolium</i>	RL (VU)
Twaite shad	<i>Alosa fallax</i>	RL (VU)
Freshwater pearl mussel	<i>Margaritifera margaritifera</i>	Annex II, Annex V, WA
Common frog	<i>Rana temporaria</i>	Annex V, WA
Killarney fern	<i>Trichomanes speciosum</i>	HD Annex II & IV
Brown long-eared bat	<i>Plecotus auratus</i>	HD Annex IV, WA
Sea lamprey	<i>Petromyzon marinus</i>	HD Annex IV, RL (NT)
Otter	<i>Lutra lutra</i>	HD Annex II & IV, WA
Irish hare	<i>Lepus timidus subsp. Hibernicus</i>	Annex V, WA, RL (LC)
Twaite shad	<i>Alosa fallax</i>	HD Annex II & V
Hedgehog	<i>Erinaceus europaeus</i>	WA
Smooth newt	<i>Lissotriton vulgaris</i>	WA
Badger	<i>Meles meles</i>	WA
Common lizard	<i>Zootoca vivipara</i>	WA
Eurasian pygmy shrew	<i>Sorex minutus</i>	WA
Red squirrel	<i>Sciurus vulgaris</i>	WA
Irish stoat	<i>Mustela erminea subsp. Hibernica</i>	WA
Fallow deer	<i>Dama dama</i>	WA

FPO = Flora Protection Order; RL = Red List, Least Concern = LC, Near Threatened = NT, VU = Vulnerable, WA = Wildlife Act

7.5.1.8 Freshwater Pearl Mussel (*Margaritifera margaritifera*)

The NPWS *Margaritifera* Sensitive Area map (Version 8, 2017) was consulted during the desk study. In addition to this, a data request was sent to the NPWS Scientific Data Unit to gain access to records for the species in the wider area.

There is no surface water connectivity between the proposed wind farm site and any *Margaritifera* sensitive catchments. The proposed development site boundary is located over 15km east of Munster Blackwater - Licky *Margaritifera* Sensitive Area. The proposed development site is in a separate surface water sub-catchment and there is no surface water connectivity in the Blackwater - Licky catchment.

A data request was submitted to the NPWS to ascertain the location of the nearest populations of the species in relation to the proposed development site. The results received from NPWS indicate that the nearest records of freshwater pearl mussel occur 3.5km northwest of the proposed development site in the Blackwater River at Ballyduff Bridge. There is no surface water connectivity between this river and the development site.

7.5.1.9 Inland Fisheries Ireland Data

The north of the proposed development site drains to the Bride sub-catchment via the River Bride and the River Glenaboy while the south of the site drains to the Tourig sub-catchment via the River Tourig and the River Glendine. The site is situated within the River Blackwater (Munster) river basin in the South Western river basin district. The site drains to the north to the Bride sub-catchment via the River Bride and the River Glenaboy. The southern section of the proposed development site drains towards the Tourig sub-catchment via the River Tourig and the River Glendine.

The Inland Fisheries Ireland (IFI) online database was assessed for records of fish species of conservation concern. Thirty-two rivers have been surveyed in the South-Western River Basin District (SWRBD) as part of the on-going catchment-wide electrofishing surveys.

The River Tourig was surveyed during 2012 and had a result of 9.4 salmon fry capture rate per minute while the River Bride had a result of 18.32 salmon fry capture rate per minute.

The River Bride was surveyed in 2014 as per the Report on Salmon Monitoring Programmes 2014 which is funded under the Salmon Conservation Fund. As part of this survey, the River Bride was found to support species including: Brown Trout, Crayfish, European eel, Flounder, Gudgeon, Lamprey sp., Salmon, Stone Loach and Three-spined Stickleback. Surveys undertaken by the Central and Regional Fisheries Boards for the South Western River Basin District Rivers Report 2009 found the River Bride to support Salmon, Brown trout, European eel, Stone loach and Sea trout.

The Central Fisheries Board hold recorded from 2003 for the River Tourig, at which time the river supported Salmon and Seatrout (Quantification of the Freshwater Salmon Habitat Asset in Ireland, 2003). No records were retrieved for the Glendine River and the Glenaboy.

Atlantic Salmon is listed in Annexes II and V of the EU Habitats Directive and in the Irish Red List for reptiles, amphibians and freshwater fish (King *et al.*, 2011) as Vulnerable, while 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.

7.5.1.10 Invasive Species

The NBDC database also contains records of invasive species identified within the relevant hectads. Records of ‘high impact’ invasive species for hectads W98 and X08 are provided in Table 7-10.

Table 7-10 NBDC records for invasive species (hectads W98 and X08)

Common Name	Scientific Name	Hectad
Japanese knotweed	<i>Fallopia japonica</i>	W98, X08
Himalayan Knotweed	<i>Persicaria wallichii</i>	X08
Himalayan balsam	<i>Impatiens glandulifera</i>	X08
Three-cornered Garlic	<i>Allium triquetrum</i>	X08
Rhododendron	<i>Rhododendron ponticum</i>	X08
American mink	<i>Mustela vison</i>	W98, X08
Eastern grey squirrel	<i>Sciurus carolinensis</i>	X08
Common Cord-grass	<i>Spartina anglica</i>	X08
Brown rat	<i>Rattus norvegicus</i>	X08
Fallow Deer	<i>Dama dama</i>	W98, X08

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 (*fallopian 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).

7.5.1.11 Baseline Hydrology

Regionally, the proposed wind farm development site is located within the Blackwater [Munster] surface water catchment (IESW) within Hydrometric Area 18 of the South Western River Basin District. A regional hydrology map is shown in Figure 10.1, Chapter 10 of this EIAR.

On a more local scale, the site is located within the Blackwater [Munster] catchment (Catchment_18) and within the Tourig sub-catchment (Tourig_SC_010) and Bride (Waterford) sub-catchment (Bride_SC_030). The development is located within the following river sub basins; Harrowhill_010, Bride (Waterford)_010, Glendine (Blackwater)_010, Tourig_010 and Glenaboy_010.

The proposed development site is divided into two main areas. In the eastern section of the site, there are four watercourses which flow from the site to ultimately discharge to the Blackwater River (Cork/Waterford) SAC. The Glendine (Blackwater) watercourse [EPA code: 18G07] flows in a south-easterly direction for approximately 6.1 km downstream prior to discharging to the SAC. The Shanapollagh [EPA code: 18S10], Lyrenacarriga watercourse [EPA code: 18L14] and Ballynatray_Common [EPA code: 18B50] flow to the Glendine watercourse.

In the western section of the proposed development site, the Tourig [EPA code: 18T03] flows in a south-eastern direction to discharge to the Blackwater River (Cork/Waterford) SAC and Blackwater Estuary SPA. The Rearour North [EPA code: 18R09] flows in a westly direction along the proposed

development boundary to join the Tourig watercourse while the Glennaglogh [EPA code: 18G40] flows in a south west direction across the proposed development boundary to join the Tourig.

To the northwest of this section the Gortnafira watercourse [EPA code: 18G49] flows along the northern boundary of the proposed development in a northly direction to join the Glenaboy watercourse [EPA code: 18G05] which continues to flow in a northly direction to the Bride (Waterford) watercourse which ultimately flows to the Blackwater River (Cork/Waterford) SAC.

7.5.1.11.1 Water Quality

The Biotic Index of Water Quality (BIWQ) was developed in Ireland by the Environmental Protection Agency (EPA). Q-values are assigned using a combination of habitat characteristics and structure of the macro-invertebrate community within the waterbody. Individual macro-invertebrate families are classified according to their sensitivity to organic pollution and the Q-value is assessed based primarily on their relative abundance within a sample.

The site is situated within the River Blackwater (Munster) river basin in the South Western river basin district. The north of the site drains to the Bride sub-catchment via the River Bride and the River Glenaboy while the south of the site drains to the Tourig sub-catchment via the River Tourig and the River Glendine. The EPA Envision map viewer was consulted on 22nd of November 2020 regarding the water quality status of the Rivers which run within and directly adjacent to the Study Area.

There are a number Environmental Protection Agency (EPA) Q-value monitoring sites situated outside of the proposal boundary. The dataset contains results for Q-value monitoring of surface waterbodies for the period 2004-2016. The sampling stations located downstream of the proposal are shown in Table 7-11 below. The EPA sampling station results provide a baseline against which any water quality changes occurring in the future can be measured.

Table 7-11 Environmental Protection Agency (EPA) Q-value monitoring sites 2004-2016 (EPA, 2018)

Sampling Station	IG Reference	Year	Q Value and Status
Glendine (Blackwater) - Br SSW of Browns Crossroad;	E 205226 N 085702	1990	Q4-5 – High
Glendine Ch E of Ballycondon;	E 206414 N 083486	2018	Q4 –Good
Glendine (Blackwater) - 0.1km d/s Glendine Church	E 207120 N 82697	1990	Q4-5 – High
Glendine (Blackwater) - Glendine Br	E 207697 N 82345	1990	Q4 –Good
Tourig Br - SE of Ballycolman;	E 201397 N 083468	1997	Q4 – Good
Tourig - Br at Inch	E 201562 N 81477.7	1990	Q4-5 – High
Ballyclogh Br - Glenaboy River;	E 198564 N 089741	2018	Q4 –Good
Glenaboy - Br N of Glenaboy	E 198807 N 89922	1990	Q4 –Good

River Basin Management Plans (RBMPs) have been published for all River Basin Districts in Ireland in accordance with the requirements of the Water Framework Directive. The online EPA Envision map viewer provides access to water quality information at individual waterbody status for all the River Basin

Districts in Ireland. This was accessed on the 22/11/2020 and the results of the surface water quality status of the watercourses which flow from the proposed development site are shown in Table 7-12.

Table 7-12 Environmental Protection Agency (EPA) WFD River Waterbody Status 2010-2015 (EPA, 2018)

Waterbody	Status	Risk
Glendine (Blackwater) (010)	Good	Not at risk
Tourig (010)	Good	Not at risk
Glenaboy (010)	Good	Not at risk
Glenaboy (020)	Moderate	At risk
Bride [Waterford] (010)	Unassigned	Not at risk

7.5.1.12 Conclusions of the Desktop Study

The desktop study has provided information about the existing environment in hectads W98 & X08, within which the proposed development site is located. The site is located in the Blackwater [Munster] surface water catchment (IESW) within Hydrometric Area 18 of the South Western River Basin District. A number of watercourses that drain the study area lead to the following downstream EU Designated Sites, and are further considered in the Natura Impact Statement prepared for the proposed development:

- > Blackwater River (Cork/Waterford) SAC
- > Blackwater Estuary SPA

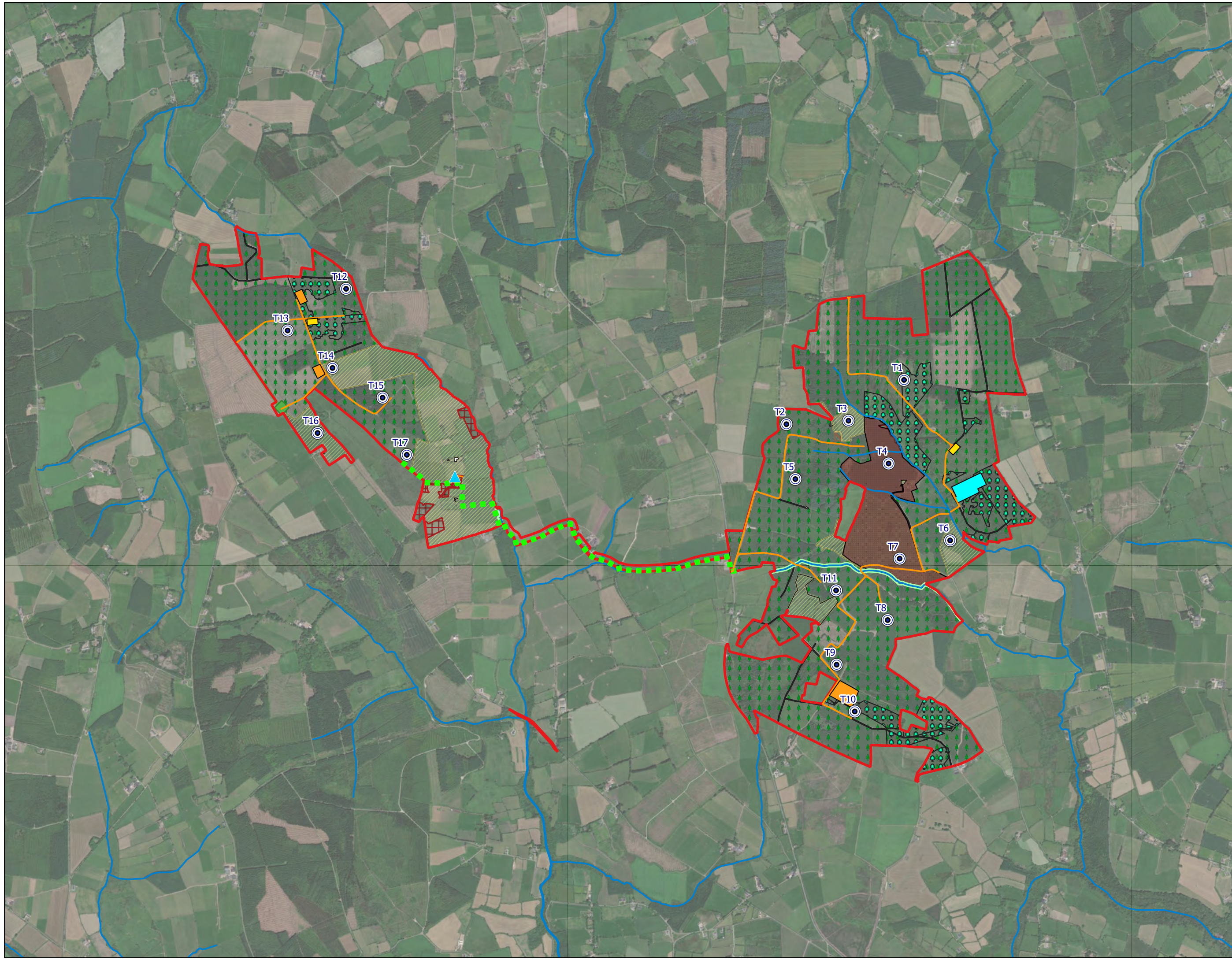
The desk study identified that a variety of protected faunal species are known to occur within the study area, including bats, marsh fritillary, otter, badger and red squirrel. The mammal species recorded during the desk study informed the survey methodologies undertaken during the site visits. The mammal species recorded within the relevant hectads have widespread range and distributions in Ireland and are likely to be recorded frequently throughout Ireland (Marnell et al, 2009¹⁰). The site is not located within a freshwater pearl mussel ‘sensitive area’.

7.5.2 Ecological Walkover Survey Results

7.5.2.1 Description of Habitats

The habitat classifications and codes correspond to those described in ‘*A Guide to Habitats in Ireland*’ (Fossitt, 2000). Detailed botanical data from relevés recorded within these habitats and it is provided in Appendix 7.1 Botanical Survey Results of this report. A habitat map of the site is provided in Figure 7-6.

¹⁰Marnell, 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.



Map Legend

- Site Boundary
- Proposed 110kV Substation
- Proposed Turbine
- ▲ Proposed Met Mast
- Proposed Borrow Pit
- - - Collector Cabling Route
- Proposed Compound
- Proposed New Road
- Existing Road Proposed for Upgrade
- Eroding/Upland Rivers (FW1)
- Arable Land (BC1)
- Buildings and artificial surfaces (BL3)
- Improved agricultural grassland (GA1)
- Dense bracken (HD1)
- Conifer plantation (WD4)
- Wet willow-alder-ash woodland (WN6)
- Scrub (WS1)
- Broadleaved Woodland (WD1-EUC)
- Hedgerows (WL1)
- Treelines (WL2)

Microsoft product screen shots reprinted with permission from Microsoft Corporation

Habitat Map	
Project Title	
Lyrenacarriga Wind Farm	
Drawn By	Checked By
H Witter	D McNicholas
Project No.	Drawing No.
170749	Figure 7-6
Scale	Date
1:1	2020.01.05

MKO

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

7.5.2.2 Habitats within the EIAR Study Area Boundary

The majority of the study area is dominated by plantation forestry, comprising mainly of Sitka spruce (*Picea sitchensis*) and Lodgepole pine (*Pinus contorta*) as well as large plantations of Eucalyptus (*Eucalyptus* sp.). The site is accessible via a network of existing forestry access tracks and forestry rides. The remainder of the wind farm infrastructure site is dominated by Improved agricultural grassland (GA1) and Arable crops (BC1). The grid connection route is also predominantly located within Improved agricultural grassland (GA1) and existing roads. The below paragraphs provide a description of the habitats recorded within the study area boundary with particular focus on those occurring within and adjacent to the development footprint.

7.5.2.2.1 Conifer plantation (WD4)

The study area is dominated by coniferous plantation forestry (Plate 7-1 and Plate 7-2). This includes forestry (WD4) of various ages (including clear-felled areas, semi-mature and mature stands, along with immature pre-thicket areas of both first and second rotation). Sitka spruce and Lodgepole pine are the dominant species, typically 8-10m tall. Mature conifer plantation is interspersed with immature stands. The understorey is typically species-poor in forestry plantations and vegetation normally restricted to a few bryophytes and ferns which include, hard fern (*Blechnum spicant*) and the moss *Thuidium tamariscum*.

As the forestry was originally planted on peat soils forestry rides or areas where forestry failed to achieve closed canopy are dominated by ling heather (*Calluna vulgaris*), heath rush (*Juncus squarrosus*), purple moor-grass (*Molinia caerulea*) and gorse (*Ulex europaeus*). These areas make up a very small area of the overall forestry plantation.

The majority of the proposed wind farm infrastructure is located within Conifer plantation (WD4) habitat which includes Turbines T1, T2, T5, T8, T9, T10, T11, T12, T13, T15 and T17, the temporary construction compounds, borrow pits and new site roads.



Plate 7-1 Example of Conifer plantation (WD4) within the study area



Plate 7-2 Example of second rotation Conifer plantation (WD4) within the study area and heath type vegetation occurring beneath.

7.5.2.2.2 Eucalyptus plantation

Large areas of the site have been planted by Eucalyptus (*Eucalyptus* sp.). This occurs in a mosaic with coniferous plantation forestry described above. An example of this eucalyptus plantation is provided in Plate 7-3. As the eucalyptus plantation was originally planted on heath habitats, plantation rides and much of the understory is dominated by ling heather (*Calluna vulgaris*), heath rush (*Juncus squarrosus*), purple moor-grass (*Molinia caerulea*) and gorse (*Ulex europaeus*).



Plate 7-3 Example of Eucalyptus plantation within the study area.

7.5.2.2.3 Improved agricultural grassland (GA1)

Improved agricultural grassland is the other dominant habitat type occurring within the study area. The sward was dominated by grass species such as perennial rye grass (*Lolium perenne*) with other grass species regularly occurring including; Yorkshire fog (*Holcus lanatus*) smooth meadow-grass (*Poa pratensis*), rough meadow-grass (*Poa trivialis*), sweet vernal-grass (*Anthoxanthum odoratum*) and creeping bent (*Agrostis stolonifera*), see Plate 7-4. Herb species typical of agricultural grassland were present and included white clover (*Trifolium repens*), creeping buttercup (*Ranunculus repens*), plantains (*Plantago* spp.), docks (*Rumex* spp.), thistles (*Cirsium* spp.), chickweed (*Stellaria media*) and ragwort (*Senecio jacobea*). Where grazing may not have been intense in the period prior to habitat surveys and where rush species had begun to take hold, improved agricultural grassland habitat graded into Wet grassland (GS4) in areas, see Plate 7-5. Detailed botanical records from these grassland habitats, where infrastructure is proposed, is provided in Appendix 7-1. Part of the proposed development infrastructure is located in this habitat including turbines no. T3, T14 and T16, as well as their associated infrastructure i.e. site access road, hardstand and blade set-down area.



Plate 7-4 Improved agricultural grassland (GA1), with farm buildings (BL3) and a drainage ditch (FW4).



Plate 7-5 Example of improved agricultural grassland (GA1) grading into wet agricultural (GS4)

7.5.2.2.4 Arable crop (BC1)

Parts of the site are dominated by arable land, typically for the growth of barley/oats. 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 7-6.



Plate 7-6 Example of arable lands occurring within the proposed development footprint.

7.5.2.2.5 Scrub (WS1)

There were a number of small areas of scrub within the study area, see Plate 7-7. These areas usually occurred where vegetation had established between forestry and the surrounding lands. The vegetation was generally dominated by willows (*Salix* sp.) and hawthorn (*Crataegus monogyna*) with an understorey of bramble (*Rubus fruticosus* agg.).



Plate 7-7 Example of scrub habitat occurring within the site boundary.

7.5.2.2.6 **Wet willow-alder-ash woodland (WN6)**

Wet willow-alder-ash woodland (WN6) was recorded along rivers that bisect the site. Tree species were dominated by ash (*Fraxinus excelsior*), willow (*Salix* sp.) and alder (*Alnus glutinosa*). Ground cover plants recorded included Ivy (*Hedera helix*), Nettle (*Urtica dioica*), Wood Dock (*Rumex sanguineus*) and Enchanter's Nightshade (*Circaea lutetiana*). See Plates 7-8 and 7-9.



Plate 7-8 Wet willow-alder-ash woodland (Wn6) occurring in close proximity to a proposed river crossing upgrade.



Plate 7-9 Wet willow-alder-ash woodland (Wn6) occurring in close proximity to a proposed river crossing upgrade.

7.5.2.2.7 Buildings and artificial surfaces (BL3)

Sections of local tarmacadam roads and existing unbound forestry access tracks that occur within the study area have been classified as Buildings and artificial surfaces (BL3). Plate 7-10 provides an example of the onsite forestry access roads occurring within the study area boundary. The onsite substation will be located in an area of Buildings and artificial surfaces (BL3) comprising of old concrete foundations, see Plate 7-11.



Plate 7-10 Example of existing onsite access roads



Plate 7-1 Example of Buildings and artificial surfaces (BL3) in which the onsite proposed permanent metmast will be located.

7.5.2.2.8 Eroding/upland rivers (FW1)

A number of small streams cross the study area, see Plate 7-12. These streams measure up to approximately two metres in width and are generally characterised by a bottom substrate of mud on cobbles and small boulders. The aquatic macrophyte flora present included fool's watercress (*Apium nodiflorum*), watercress (*Rorippa nasturtium-aquaticum*), water mint (*Mentha aquatica*) and common duckweed (*Lemna minor*). These small streams are classified as eroding/upland rivers (FW1).



Plate 7-2 Small stream, an example of an Upland eroding watercourse located within the EIAR study area boundary

7.5.2.2.9 **Drainage ditches (FW4)**

Although they can be difficult to separate from small streams, linear man-made ditches that contained flowing water have been classified as drainage ditches (FW4), see Plate 7-13. Where these occur within or in close proximity to plantation forestry, they were generally species poor and modified in nature.



Plate 7-13 Drainage ditch (FW4) occurring within the site boundary.

7.5.2.2.10 Hedgerows (WL2)

Hedgerows recorded within the Proposed Development are associated with field boundaries within the study area. Many are established along raised banks (Plate 7.14). The species that most frequently occurred were hawthorn, blackthorn (*Prunus spinosa*), willow, bramble and gorse with occasional individuals of other species like ash and sycamore.



Plate 7-14 Hedgerow (WL1) occurring within the site boundary

7.5.2.2.11 **Treelines (WL2)**

Treelines were mapped along the field boundaries within the study area, see Plate 7-15. The commonest tree species encountered were Ash, Willow, Birch and Sycamore.



Plate 7-15 Example of treeline occurring along field boundary within the study area

7.5.2.2.12 Invasive species

Both *Rhododendron* (*Rhododendron ponticum*), see Plate 7-16 was encountered within the study area. The species is listed on the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015). No additional species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 were recorded during the surveys.



Plate 7-16 Example of *Rhododendron* recorded within the ELAR study area boundary, north-northwest of Turbine no. T16.

7.5.2.3 Habitats along the Turbine Collector Cable Route

The following description of the habitats occurring along the proposed collector cable route starts at the south-eastern part of the study area and describes the habitats that occur along the route as they occur in a generally westerly direction.

The collector cable route leaves the site access track off the R634 (west of Turbine 11) before crossing the R634 (BL3) into agricultural fields comprising of improved agricultural grassland (GA1). This route running in parallel with an existing watercourse, however, is offset by an appropriate buffer i.e. in excess of 10 metres, see Appendix 2. The collector cable route then runs adjacent to a hedgerow before being located within a local road (see Plate 7-17) for approximately 500 linear metres. At this point the collector cable route crosses the Glennaglogh River within the road infrastructure (see Plate 7-18). There will be no requirement for instream work.

The turbine connector route then moves east from the local road through Improved agricultural grassland (GA1) adjacent to an established hedgerow, see Plate 7-19. The turbine connector route will then cross the River Tourig, utilising an area where the riverside vegetation has been historically cleared to allow livestock access the river for drinking water. This therefore avoids any need for significant riparian vegetation removal (see Plate 7-20).

The turbine connector route then crosses a number of fields comprising predominantly of Improved agricultural grassland (GA1) divided by hedgerows (WL1) before connecting to T17 within the southeast of the site.

Plate 7-20 The turbine connector route will cross the River Tourig, utilising an area where the riverside vegetation has been historically cleared to allow livestock access the river for drinking water.



Plate 7-17 Local road along which the turbine collector cable route will be located for part of the route.



Plate 7-18 The Glennaglogh River, located along the turbine connector route, which will be located within the existing road over the bridge.



Plate 7-19 Improvised agricultural grassland (GA1) and hedgerow (WLI) along which the proposed turbine collector cable route will be located.



Plate 7-20 The turbine connector route will cross the River Tourig, utilising an area where the riverside vegetation has been historically cleared to allow livestock access the river for drinking water.

7.5.2.4 Habitats along the proposed turbine delivery route

A short section of proposed site access track occurs to the south of the proposed wind farm development. This proposed access track is required to facilitate turbine delivery and is located within an agricultural grassland (GA1). Impacts are therefore restricted to improved agricultural grassland and an individual immature ash tree.

No botanical species protected under the Flora (Protection) Order, 2015, listed in the EU Habitats Directive (92/43/EEC), or listed in the Irish Red Data Books were recorded on the site and no suitable habitat occurs within the site. All species recorded are common in the Irish landscape.

7.5.2.5 Fauna

Dedicated faunal walkover surveys were undertaken at the site on various dates between 2018 and 2020, including the 31st August 2018, 05th October 2018, 26th of September 2019, 29th May 2020 and 19th November 2020. Incidental records from observations during dedicated bird surveys were also recorded and have been assessed in this impact assessment.

In addition to the above targeted surveys, additional faunal signs/sightings were also recorded during other surveys including habitat assessments, bat surveys and bird surveys.

7.5.2.5.1 Badger

Areas identified as providing potential habitat for badger were subject to specialist targeted surveys on the 31st August 2018, 05th October 2018, 26th of September 2019, 29th May 2020 and 19th November 2020. The badger surveys covered the entire development footprint and surrounding suitable habitats in the study area.

Evidence of badger was recorded during the walkover survey including a badger sett (comprising of six active/unobstructed entrances), foraging signs, prints and the presence of runs.

The badger sett was recorded within plantation forestry, approximately 220 metres to the south of proposed Turbine no. T5. An example of some of the entrances recorded at this location is provided in Plate 7-21. The location of the sett is shown in Figure 7.7 Confidential Appendix 7-4¹¹. A small spoil heap was noted outside the entrances and the entrance was clear of debris, suggesting that the sett is in regular use. The surrounding hedgerows and scrub and woodland was searched for the presence of other setts, although no other setts were recorded. The sett has been classified as a main sett, as per guidance in Smal (1995¹²).

¹¹ The location is confidential to ensure the protection of the species and this process is in accordance with standard best practice.

¹² Smal, C. 1995 The badger and habitat survey of Ireland. Dublin. Government Stationery Office

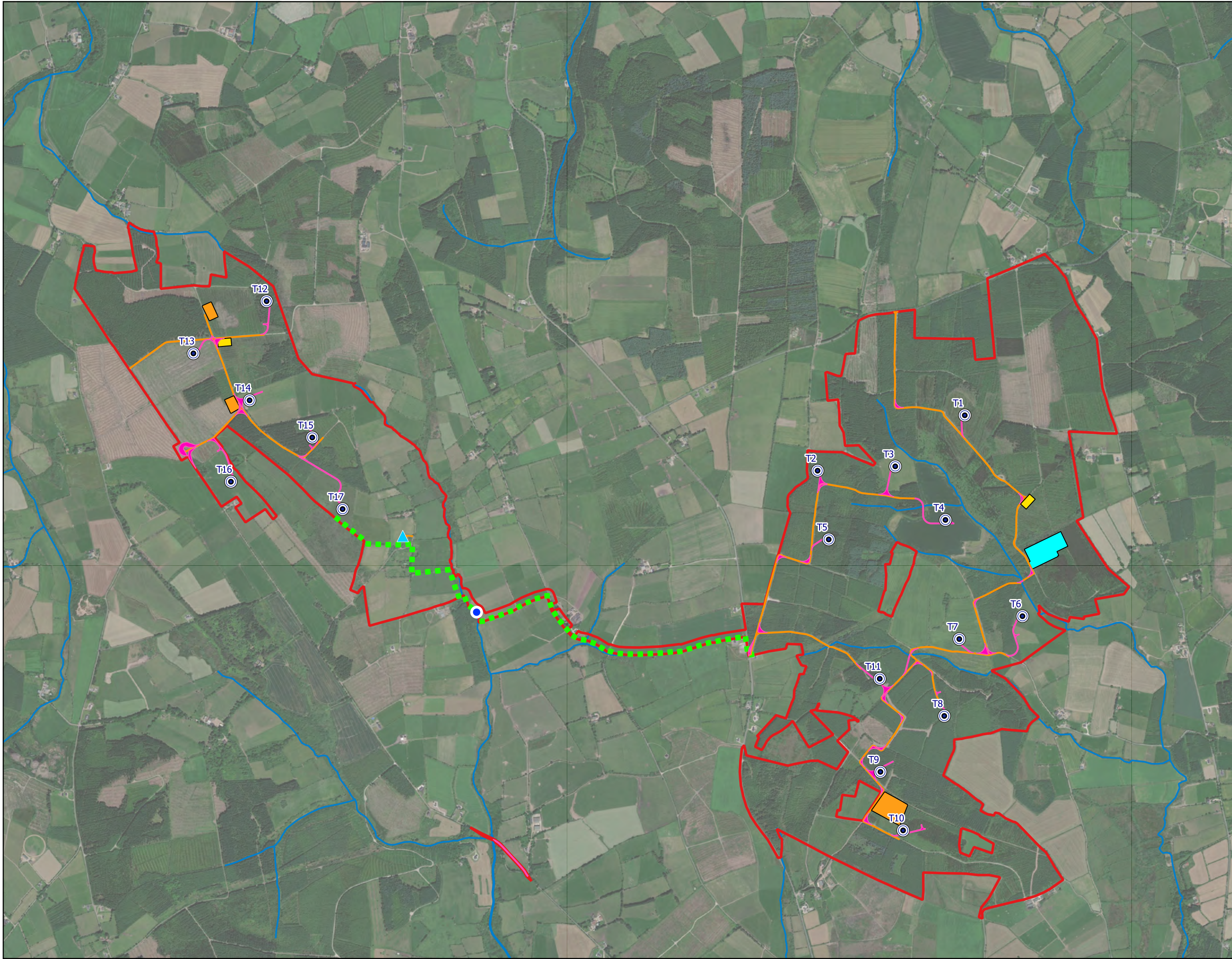


Plate 7-21 Example of two entrances to a badger sett recorded within the EIAR study area boundary

7.5.2.5.2 Otter

Areas identified as providing potential habitat for otter, i.e. watercourses within and in close proximity to the site, were subject to specialist targeted survey. The otter survey of watercourses was conducted on the 31st August 2018, 05th October 2018, 26th of September 2019, 29th May 2020 and 19th November 2020. The watercourses located in close proximity to, or downstream of, the windfarm infrastructure and cable route were surveyed for any evidence of otter in proximity to the development footprint.

The watercourses were assessed as providing suitable commuting and foraging habitat for otter and the species may occur within the EIAR site boundary, at least on occasion. Otter signs i.e. spraints, were recorded in suitable habitat within the EIAR study area boundary, specifically, downstream of the connector cable route along the River Tourig. Figure 7-8 provides the location of all otter records within the EIAR study area boundary. The fisheries potential of the upper reaches of watercourses within the site is poor, owing to the small, vegetated nature of the drainage ditches. Therefore, otter are more likely to utilise the lower reaches of the watercourses, downstream of the proposed development site.



Map Legend

- Site Boundary
- Proposed 110kV Substation
- Proposed Turbine
- ▲ Proposed Met Mast
- Proposed Borrow Pit
- - - Collector Cabling Route
- Proposed Compound
- Proposed New Road
- Existing Road Proposed for Upgrade
- EPA Mapped Watercourses
- Otter spraint

Microsoft product screen shots reprinted with permission from Microsoft Corporation

Otter Record	
Project Title	
Lyrenacarriga Wind Farm	
Drawn By	Checked By
H Witter	D McNicholas
Project No.	Drawing No.
170749	Figure 7-8
Scale	Date
1:20000	2020.11.12

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



Plate 7-4 Example of otter spraint recorded within the EIAR study area boundary, along the River

7.5.2.5.3 Bats

Full details of survey results are provided in the stand-alone bat report, Appendix 7.2 of the EIAR.

Bat surveys were undertaken in 2017, 2018 and 2019. Bat surveys, survey design and all other data collection were designed and conducted by Pat Doherty MSc, MCIEEM. Scope development and project management was undertaken by Pat Doherty of Doherty Environmental Ltd.

Data analysis was undertaken, and results were compiled by Aoife Joyce (BSc., MSc.) and Luke Dodebier (BSc.). The data from the 2019 surveys forms the core dataset for the assessment of effects on bats at the proposed development site. The impact assessment and mitigation provided in bat report are in accordance with Scottish Natural Heritage (SNH) 2019 Guidance. It is supplemented by additional data derived from surveys undertaken on the site in 2017 and 2018. Bat surveys included roost survey, manual transect surveys and ground-level static surveys.

Roost surveys

One structure, (IG Ref: W 99673 87430) first identified in 2017, was assessed as having potential to support roosting bats and was subject to subsequent roost assessment on the 29th of July 2019. No evidence of bat use was recorded during the roost assessment.

No potential tree roosts were identified during the roost surveys and no evidence of bat use was recorded elsewhere during the roost assessment.

Manual transects 2019

Manual transects were undertaken in spring, summer and autumn 2019. Bat activity was recorded on all surveys. A total of 141 bat registrations were recorded during the 2019 manual transect surveys. Of these 78 registrations (or 55% of all registrations) were assigned to Soprano pipistrelle; 32 registrations

(or 24% of all registrations) were assigned to Common pipistrelle; 23 registrations (or 16% of all registrations) were assigned to Leisler's bat; 5 registrations (or 3% of all registrations) were assigned to Myotis species; and 3 registrations (or 2% of all registrations) were assigned to Brown long-eared bat.

However, species composition and activity levels varied significantly between surveys. Figure 4-1 to 4-6 show the special distribution of bat species for each survey during 2019 (see Appendix 7-2 of the EIAR 'bat report'). Bat activity was concentrated along the linear features such as mature forestry edge habitats.

Ground-level Static Surveys 2019

In total, 104,823 bat passes were recorded across all deployments. In general, Soprano pipistrelle (n=49,598), Common pipistrelle (n=32,378) and Leisler's bat (n=18,242) occurred most frequently, while instances of Myotis sp. (n=4188), Brown long-eared bat (n=408) and Nathusius pipistrelle (n=9) were significantly less.

Activity was variable between survey nights. Therefore, the median Nightly Pass Rate including absences was used as the most appropriate measure of bat activity (Lintott & Mathews, 2018¹³). Results for each species can be found in Section 4.6 of the bat report presented in Appendix 7.2 of this EIAR.

7.5.2.5.4 Marsh Fritillary

The desk study identified that marsh fritillary is known to occur in the wider area surrounding the proposed development site. Based on the findings of the desk study dedicated marsh fritillary habitat suitability surveys were undertaken. Particular attention was given to potential habitats in close proximity to the proposed infrastructure, given the size of the EIAR study area boundary. Following the identification of suitable habitat within the study area, dedicated larval web surveys for the species were undertaken on the 31st August 2018 and 26th of September 2019. Suitable habitat was recorded in small areas within the EIAR study area, particularly along forestry access roads and local roads, see Plate 7-21.

A single marsh fritillary colony was identified within the EIAR study area boundary on the 31st August 2018. This was located along a short 20m section of forestry access track, adjacent to a junction with a local road at Grid ref: IW 99367 87463. A total of two no. larval webs were recorded and were restricted to this small area, see Plate 7-22. No other records of marsh fritillary were recorded within the EIAR study area boundary, despite survey effort focusing on the small scattered roadside verges throughout the site. No marsh fritillary butterflies were recorded during any walked transects of the site during the summer months when the species are active as adults.

¹³ Lintott, P., & Mathews, F. (2018). *Reviewing the evidence on mitigation strategies for bats in buildings informing best-practice for policy makers and practitioners*



Plate 7-5 Example of narrow strip of suitable marsh fritillary habitat occurring along a forestry access track that adjoins a local road within the ELAR study area boundary.



Plate 7-22 Example of marsh fritillary larval webs recorded along a forestry access track.

In addition to the larval web searches, habitat suitability assessments were undertaken during larval web searches within areas of suitable habitat for the species. This followed methods set out in National Biodiversity Data Centre (NBDC¹⁴) best practice guidance. The results of the condition assessment were focused on assessing the quality of the marsh fritillary habitat identified on site during the initial walkover surveys. 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. While the small linear strips of suitable habitat for the species generally provided good supporting habitat, these areas are becoming encroached by bramble, and in some places gorse. This is due to their occurrence along forestry access tracks, located immediately adjacent to large forestry plantations, see Plate 7-21 above.

The marsh fritillary colony identified within the site occur adjacent to a proposed junction modification required to facilitate turbine delivery (see, Figure 7-9). Thus, further was deemed to be required and is detailed in Section 7.6 of this EIAR.

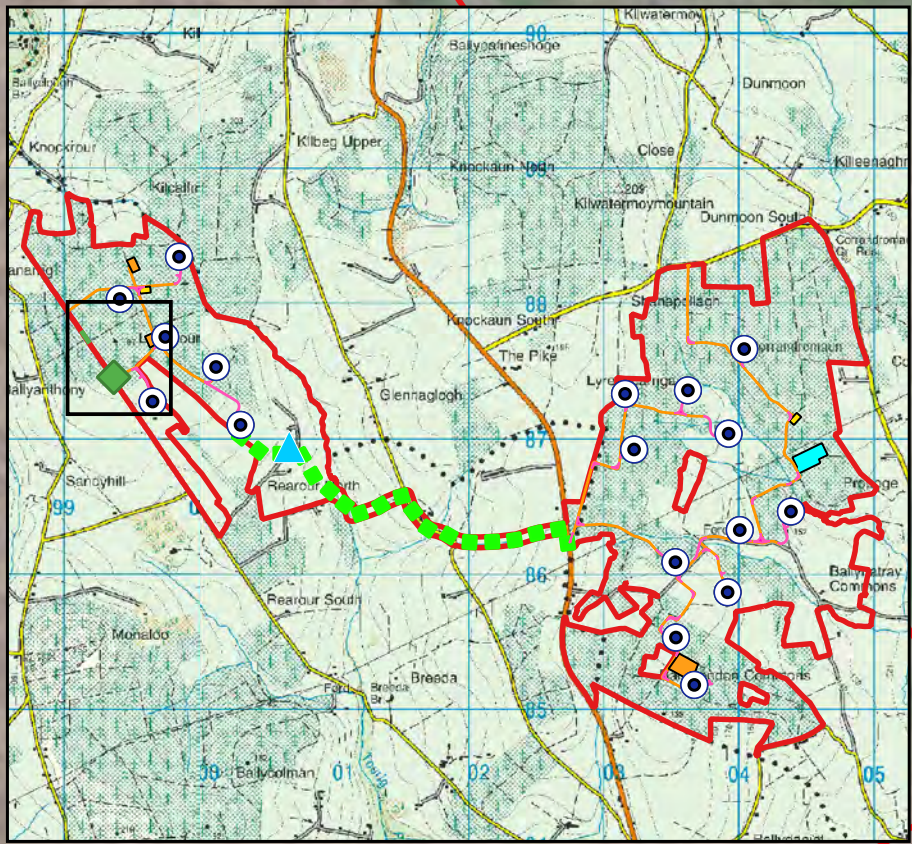
7.5.2.5.5 Red Squirrel

Dedicated red squirrel (*Sciurus vulgaris*) surveys were undertaken, including walked transects through woodland habitats. All evidence of red squirrel was recorded including potential dreys and feeding signs, see Plate 7-23. Although lots of feeding signs were recorded along each of the transects, only one old (inactive) drey was recorded on the 5th October 2018. One sightings of the species were recorded along a local road on the 5th October 2018. Figure 7-10 provides all records of red squirrel recorded along the walked transect routes.

















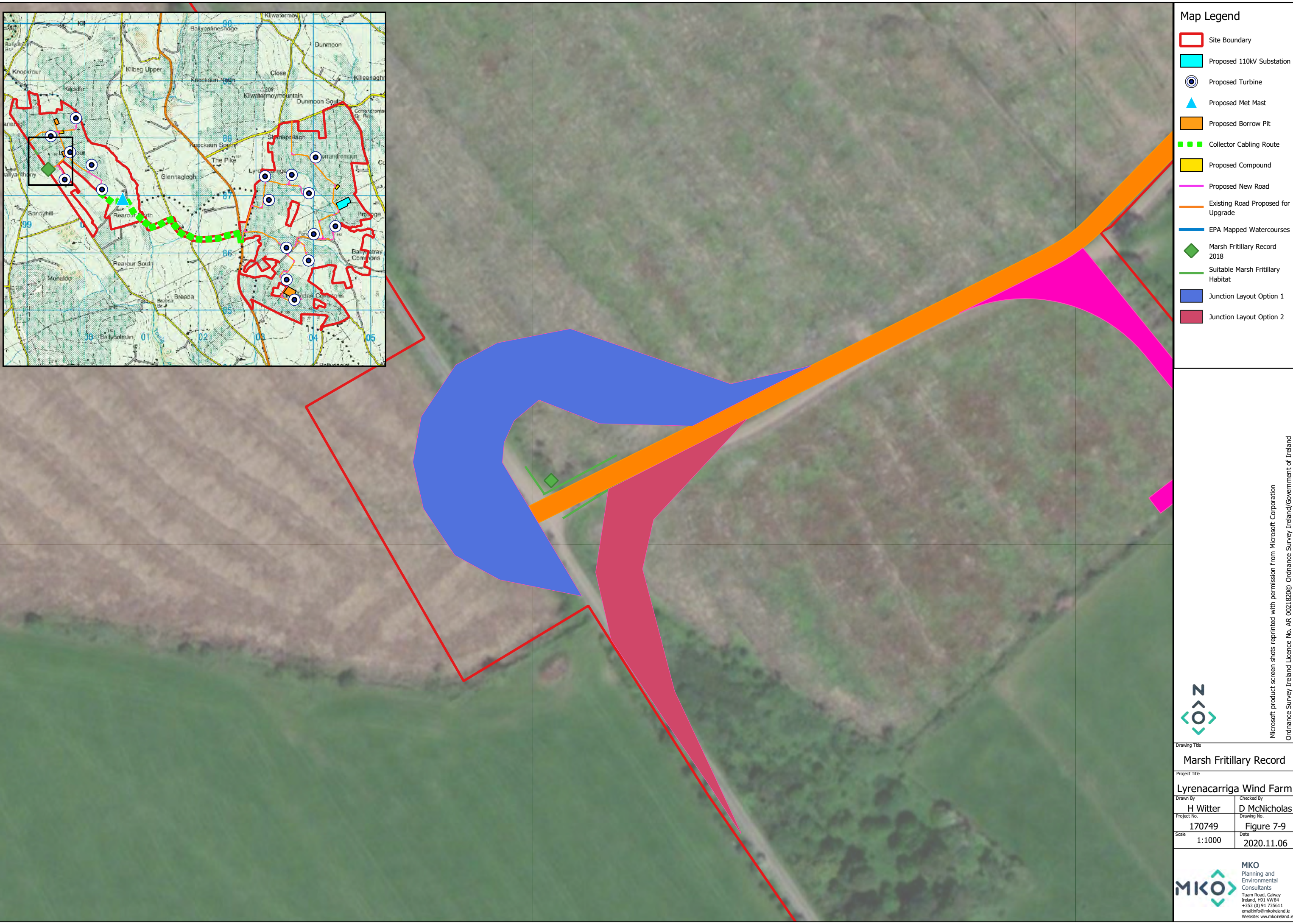
Plate 7-6 Example red squirrel feeding signs (stripped pine cones) recorded within coniferous plantation forestry within the EIAR study area boundary

¹⁴ 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



Map Legend

-  Site Boundary
-  Proposed 110kV Substation
-  Proposed Turbine
-  Proposed Met Mast
-  Proposed Borrow Pit
-  Collector Cabling Route
-  Proposed Compound
-  Proposed New Road
-  Existing Road Proposed for Upgrade
-  EPA Mapped Watercourses
-  Marsh Fritillary Record 2018
-  Suitable Marsh Fritillary Habitat
-  Junction Layout Option 1
-  Junction Layout Option 2

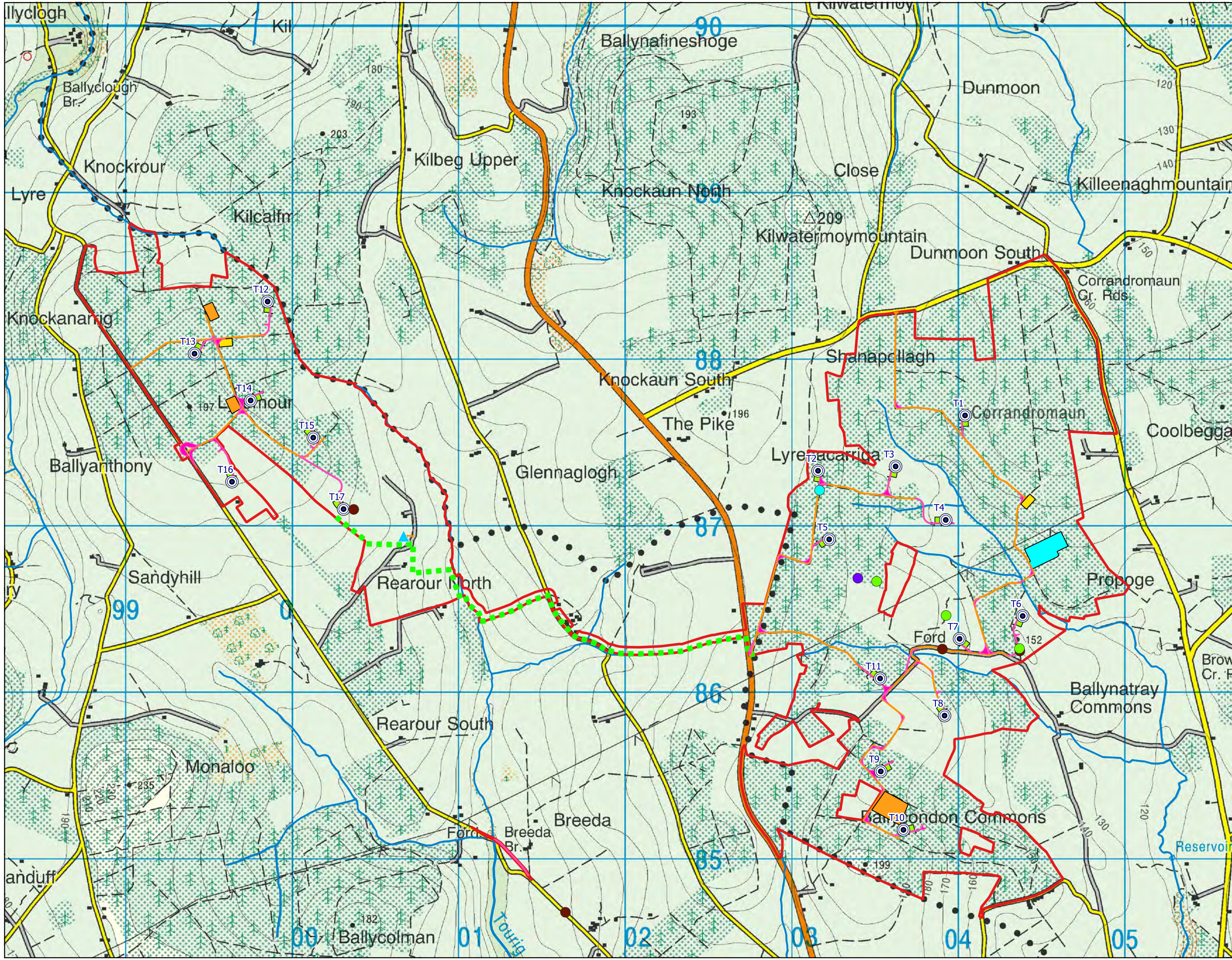


Microsoft product screen shots reprinted with permission from Microsoft Corporation
Ordnance Survey Ireland Licence No. AR 0021820 © Ordnance Survey Ireland/Government of Ireland

Drawing Title	
Marsh Fritillary Record	
Project Title	
Lyrenacarriga Wind Farm	
Drawn By	Checked By
H Witter	D McNicholas
Project No.	Drawing No.
170749	Figure 7-9
Scale	Date
1:1000	2020.11.06



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
- Site Boundary
 - Proposed 110kV Substation
 - Proposed Turbine
 - ▲ Proposed Met Mast
 - Proposed Borrow Pit
 - Collector Cabling Route
 - Proposed Compound
 - Proposed New Road
 - Existing Road Proposed for Upgrade
 - Badger foraging signs
 - Deer Droppings
 - Fox signs
 - Pine marten scat
 - Squirrel Signs
 - EPA Mapped Watercourses

Ordnance Survey Ireland Licence No. AR 00218200 © Ordnance Survey Ireland/Government of Ireland

Mammal Record

Project Title: **Lyrenacarriga Wind Farm**

Drawn By: H Witter	Checked By: D McNicholas
Project No.: 170749	Drawing No.: Figure 7-10
Scale: 1:20000	Date: 2020.12.17

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

7.5.2.6 Fisheries and Aquatic Invertebrate Surveys

The small streams that flow off the site of the development, and downstream watercourses, were subject to biological evaluation and assessment through kick sampling. The location of all kick samples is provided in Figure 7-3. The results of the kick samples are provided in Appendix 7-3 of the EIAR.

The survey included a general habitat assessment and biological water quality assessment at watercourse within or downstream of the EIAR study area boundary, including the underground cabling route. The water quality, as per Q-value (Quality Rating System)¹⁵, is fully described in Appendix 7-3. Three of the four sample locations assessed were Q3 'Poor', and one as Q3-4 'Moderate'.

Overall, the watercourses with the highest value for fish species were the lower survey reaches of the main watercourses that drain the site, see Plate 7-13. The small watercourses located in the upper reaches of the catchment that occur within the site were generally upland, eroding watercourses and often featured dry, or partly dry features, generally not conducive to supporting resident salmonids, European eel, lamprey or white-clawed crayfish. These watercourses are generally small and subject to varying water levels associated with periodic rainfall events, see Plate 7-24.



Plate 7-24 Example of small watercourses occurring within the EIAR study area boundary providing low flow, dry in some places, as a result of intermittent rainfall events. Such watercourses provide low suitability for fish species.

¹⁵ 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.



Plate 7-25 Example of Upland eroding watercourse located within the ELAR study area boundary providing some suitable supporting fish habitat locally.

7.5.2.6.1 Reptiles and Amphibians

Common frog (*Rana temporaria*) was recorded in wet areas within the site. The species is likely to breed within the study area. Common lizard (*Zootoca vivipara*) and Smooth newt (*Lissotriton vulgaris*), while not recorded during the site visits, are likely to occur within the study area.

The proposed development will not result in a significant loss of suitable habitat for reptiles, amphibians or invertebrates. Suitable habitat is widespread in the study area and beyond. No likely significant effects on these species are anticipated and therefore further survey/ assessment was not necessary.

7.5.2.6.2 Other Fauna

During the walkover survey, additional mammal species were recorded, see Figure 7-10. Fox (*Vulpes vulpes*) scat was recorded at various locations in the study area. However, no dens or other signs of the species were recorded during the survey and as a result no dedicated survey for the species was required. As signs of fox were regularly recorded throughout the site, the distribution of the species has not been mapped.

The proposed development site is comprised of a variety of habitats and extends across a large area. Evidence of pine marten (*Martes martes*) was also recorded in the form of scats (droppings) indicating their presence within the study area. However, the low level of records suggest that the site does not support a significant population requiring further assessment. In addition to fox, it is likely that other species also occur in or around the proposed development site. Due to the nature of the habitats occurring on site, it is highly likely that other mammals, including Irish hare (*Lepus timidus hibernicus*), rabbit (*Oryctolagus cuniculus*), stoat (*Mustela erminea*), brown rat (*Rattus norvegicus*), as well as small mammals such as woodmouse (*Apodemus sylvaticus*), pygmy shrew (*Sorex minutus*) and hedgehog (*Erinaceus europaeus*), utilised the site. No signs of any of these species were recorded during the walkover surveys and thus no requirement for dedicated surveys was identified.

Incidental records of invertebrate 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 study area:

- > Green-veined white (*Pieris napi*)
- > Speckled wood (*Pararge aegeria*)
- > Small tortoiseshell (*Aglais urticae*)
- > Common blue (*Polyommatus icarus*)
- > Buff-tailed bumblebee (*Bombus terrestris*)
- > Garden spider (*Araneus diadematus*)
- > Crane fly (*Tipulidae sp*)
- > Small copper (*Lycaena phlaeas*)
- > Common hawker (*Aeshna juncea*)
- > Fox moth (*Macrothylacia rubi*)

7.5.2.7 Identification of Key Ecological Receptors

Table 7.13 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 7-1 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 Site is located downstream of the proposed development and has been identified as being within the likely Zone of Impact:</p> <ul style="list-style-type: none"> > Blackwater River and Estuary pNHA 	Yes
	<p>European Designated Sites</p> <p>The following European Sites 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"> > Blackwater River (Cork/Waterford) SAC, and > Blackwater Estuary SPA <p>These sites are assigned International importance and are included as KERs.</p>	Yes

Ecological feature or species	Reason for inclusion as a KER	KER
Aquatic Habitats and related species	<p>Rivers and Streams</p> <p>Rivers and Streams within the wind farm site have been assigned Local importance (Higher Value) in that, whilst many are highly modified within the existing plantation forestry (WD4), they are conduits to waterbodies with a high biodiversity value in the local area. They also provide a conduit to the downstream Blackwater River (Cork/Waterford) SAC of international importance.</p> <p>Watercourses within the Blackwater River (Cork/Waterford) SAC and Blackwater Estuary SPA (i.e. downstream of wind farm site and at watercourse crossings and on the grid connection route) are of International Importance.</p> <p>The watercourses are classified as a KER due to the potential for indirect effects.</p>	Yes
	<p>Drainage Ditches</p> <p>The site of the proposed development is drained by numerous drainage ditches. These are small man-made channels that are often devoid of vegetation and regularly maintained or choked with vegetation and are slow flowing. These drains are assigned Local Importance (Lower Value).</p>	No
	<p>Aquatic Fauna – Including Fisheries and Invertebrates</p> <p>The aquatic species that are associated with the rivers and streams that are located within and surrounding the site are assigned Local Importance (Higher Value) in that they have a high biodiversity value in the local context.</p> <p>Populations of aquatic species listed as QIs of the Blackwater River (Cork/Waterford) SAC are known to occur downstream of the development site within the SAC (i.e. Atlantic salmon, Twaite shad, Lamprey species, White-clawed crayfish). These species are of International Importance.</p> <p>No instream works are proposed as part of the development therefore no potential for direct impact on the receptor exists. The proposed development has the potential to result in indirect effects on the receptor and it is therefore included as a KER for further assessment along with Upland eroding rivers and streams.</p>	Yes
Grassland habitats and Scrub	<p>Improved Agricultural Grassland (GA1), improved Wet Grassland (GS4) and Scrub (WS1)</p> <p>A small area of these habitats will be lost to the proposed development footprint. The habitats are of some local importance to local wildlife (NRA, 2009). As such, the habitat has been assessed as of Local Importance (lower value). These habitats are not of ecological significance and are not classified as a KER.</p>	No
Built and man-made habitats	<p>Spoil and Bare Ground, Recolonising Bare Ground and Buildings and Artificial Surfaces</p>	No

Ecological feature or species	Reason for inclusion as a KER	KER
	The habitat has been assessed as of Local Importance (lower value) as it is largely associated with artificial site access tracks and is of low biodiversity value. For this reason, it has not been identified for further assessment and is not a KER.	
Conifer Plantation (WD4)	Plantation forestry is of low ecological importance due to the dominance of coniferous species (predominantly Sitka spruce and lodgepole pine) and lack of biodiversity within the habitat and was therefore assigned Local Importance (lower value) . This habitat is not classified as a KER.	No
Eucalyptus plantations	As the Eucalyptus plantations occurs in association with coniferous plantation forestry (WD4), they have been assessed here as part of the plantation forestry due to the ‘crop’ nature of the plantation and the resulting highly modified nature of the receiving environment.	No
Arable crops (BC1)	The habitat has been assessed as of Local Importance (lower value) as it is associated with high modified and intensive agriculture and is therefore of low biodiversity value. For this reason, it has not been identified for further assessment and is not a KER.	No
Wet willow-alder-ash woodland (WN6)	Wet willow-alder-ash woodland (WN6) recorded within the study area conforms the Annex I habitat classification *Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-padion, Alnion incanae, Salicion albae) (91E0). The woodlands are classified as County Importance on the basis of supporting semi-natural habitat types, along established watercourses, with high biodiversity and high degree of naturalness in a local context. As a small section of access track partly occurs within a small section of this habitat, the habitat has been identified as KERs for further assessment.	Yes
Hedgerows and Treelines	Hedgerow and Treelines within the study area are assigned Local Importance (higher value) based on supporting semi-natural habitat types with high biodiversity and high degree of naturalness in a local context. Hedgerow are included as KERs due to the potential for direct impact.	Yes
Invasive species	Rhododendron and Giant hogweed were recorded within the EIAR study area boundary. From a precautionary perspective, the species has been included as a KER for further assessment to ensure that there is no spread of the species associated with the proposed development.	Yes
Badger	Badger as an ecological receptor has been assigned Local Importance (Higher value) on the basis that an active badger sett occurs within the EIAR study area boundary along with suitable habitat. The study area is likely to be utilised by a locally occurring badger population of Local Importance. Direct impacts on badger are not anticipated as the badger sett identified within the EIAR study area boundary is located away from the proposed infrastructure. There will be no loss of resting or breeding places associated with the development. Given the small scale nature of the proposed infrastructure footprint in relation to the availability of suitable habitat for the species, no potential for significant habitat loss or disturbance/displacement has been identified. Given the presence of an active sett within the EIAR study area boundary, from a precautionary perspective, the species has been included as a KER for further assessment.	Yes

Ecological feature or species	Reason for inclusion as a KER	KER
Otter	<p>A single record of otter was recorded within the site boundary. Based on the low number of otter records within the study area and the low suitability of the smaller watercourses/drains occurring within the upper reaches of the catchment (in which the turbine infrastructure is located i.e. turbine hardstands and access roads), otter has been assessed as of Local Importance (higher value). This is also because the species is listed in Annex I and IV of the EU Habitats Directive. No evidence of a more ecologically important population was recorded during any of the site surveys undertaken. Where otter occurs downstream of the proposed development within the Blackwater River (Cork/Waterford) SAC, it has been assessed as of International Importance. The Proposed Development has the potential to result in indirect effects on the receptor (as a result of deterioration in water quality (supporting habitat) or disturbance/displacement during construction/ decommissioning) and it is therefore included as a KER and requires further assessment.</p>	Yes
Bats	<p>Bat species have been assessed as of Local Importance (Higher Value) as they represent a resident or regularly occurring populations assessed to be important at the Local level and are listed in Annex IV of the EU Habitats Directive.</p>	Yes
Marsh fritillary	<p>The population recorded has been assessed as of Local Importance (Higher Value) importance as they are listed in Annex II of the EU Habitats Directive and it is likely that the small population on site is important in the local context. Given the close proximity of the proposed infrastructure, notably a junction modification, in relation to the identified colony and the location of suitable habitat, there is potential for direct or indirect impact. Taking a precautionary approach, the species has been identified as a KER for further assessment.</p>	Yes
Red squirrel	<p>The population recorded has been assessed as of Local Importance (Higher Value) as the suitable habitat on site is dominated by highly modified plantation forestry of varying ages/stages in its crop cycle and subject to ongoing forestry activities.</p> <p>The proposed development footprint has the potential to result in direct and indirect effects on red squirrel. However, it is likely that the population within the ELAR study area boundary would remain viable given the size of their home ranges and the very small losses of forestry associated with the proposed infrastructure. It is likely the loss of resources from any individual squirrels would be insignificant. In addition, the proposal will not result in any significant fragmentation of red squirrel habitat. Therefore, the species has not been included as a KER.</p>	No
Additional protected fauna	<p>The recorded evidence suggests that the study area is not utilised by populations of higher than local significance and no potential for significant effects have been identified at the population level. Due to the small footprint and nature of the proposed development, they are unlikely to be significantly affected by the proposed development. For this reason, other faunal species are not considered further in this ELAR. Significant effects are not anticipated.</p>	No

7.6 Ecological Impact Assessment

7.6.1 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 commercial forestry and for agriculture. This would continue to involve the harvesting of timber as it matures, followed by the coniferous forestry replanting as well as ongoing agricultural activities. The other habitats identified within the EIAR study area would likely remain in a similar condition. 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.

7.6.2 Effects on Designated Sites

None of the elements of the proposed development are located within the boundaries of any National or European designated sites. There will be no direct effects on any designated site as a result of the construction, operation and decommissioning of the wind farm project including the haul route, substation and grid connection.

One nationally designated site was identified as being within the zone of influence and as KERs, namely, Blackwater River And Estuary pNHA.

NHAs or pNHAs 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 recorded and referenced in this chapter.

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

As per the EPA draft Guidance (2017¹⁶), “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:

‘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:

- *Blackwater River (Cork/Waterford) SAC,*
- *Blackwater Estuary SPA, and*
- *Ballymacoda Bay SPA.*

(August 2017) Environmental Protection Agency (EPA) ‘Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports’

As a result, an Appropriate Assessment is required, and a Natura Impact Statement 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,

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

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

7.6.3 Potential Introduction or Spread of Invasive Alien Plant Species

Pre-Mitigation Impacts

Third Schedule invasive species Rhododendron was recorded within the EIAR study area boundary. As some stands occur within the proposed development infrastructure footprint, there will be a requirement for treatment or site-specific management. Therefore, a pre-construction invasive species survey will be undertaken as part of the Proposed Development. This will provide updated data in advance of any construction given the intervention time period between the original survey work and any future grant of permission/construction. Measures will be in place to prevent the spread of invasive species during the proposed construction works. In addition, all necessary precautions will be taken to prevent the introduction of invasive species to the site from elsewhere.

Proposed Biosecurity Measures and Best Practice

In order to facilitate construction where Rhododendron occurs within the development footprint, the following mitigation is proposed to avoid any further spread of the species:

- Rhododendron will be clearly marked using posts and tape prior to any machinery/personnel entering the site (this includes site investigation, clearance, fencing or set up works). All fencing will be monitored and maintained for the duration of the works. This will be supervised by the project ecologist.
- Where works cannot avoid areas of Rhododendron, the proposed method of removal is by means of cutting and digging. This will be carried out by a suitably qualified individual familiar with Rhododendron and the potential risks associated with the plant. Firstly, all overgrowth will be removed by means of cutting. This will take place outside of the optimal seed dispersal period (Feb-May) (Edwards, 2006).
- Any stumps and roots which require removal during the cable installation/windfarm development will be removed either manually or by using a digger.
- To avoid regrowth, Rhododendron material removed will be mulched and spread within the site. If stumps cannot be mulched these will be buried upside down at a depth of 2m in a designated location within the site.
- All Rhododendron material will be stockpiled in a clearly defined fenced off area within the site. All fencing will be monitored and maintained for the duration of the works.
- On completion of the proposed development, the site will be monitored for Rhododendron encroachment. Any encroachment will be sprayed and/or removed via the above treatment methods. Any spraying will be carried out with a suitable herbicide following the manufactures instructions.

- Good construction site hygiene will be employed to prevent the spread of these species with vehicles thoroughly cleaned down prior to leaving any site with the potential to have supported invasive species. All plant and equipment employed on the construction site (e.g. excavator, footwear, etc.) will be thoroughly cleaned down on site to prevent the spread of invasive plant. All clean down must be undertaken in areas with no potential to result in the spread of invasive species.
- Any material that is imported onto any site will be verified by a suitably qualified ecologist to be free from any invasive species listed on the ‘Third Schedule’ of Regulations 49 & 50 of Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011). This will be carried out by searching for rhizomes and plant material.

The control of invasive alien species will follow guidelines issued by the National Roads Authority - *The Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads* (NRA 2010¹⁷).

7.6.4 Likely Significant Effects During Construction Phase

7.6.4.1 Effects on Habitats During Construction

Table 7-14 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 within the EIAR study area.

Table 7-2 Extent of habitat lost to the proposed development footprint

Habitat	Area (ha)/length (km) to be lost
KER Habitats	
Wet willow-alder-ash woodland (WN6)	0.02ha
Hedgerow (WL1)/Treelines (WL2)	236 linear metres
Depositing/lowland rivers (FW2)	0
Non KER Habitats	
Improved agricultural grassland (GA1)	2.3ha
Wet grassland (GS4)	0
Scrub (WS1)	0.042ha
Conifer plantation (WD4) /Eucalyptus plantation	18.8ha
Spoil and bare ground	NA
Buildings and other artificial surfaces (Roads)	0.037ha
Arable crop (BC1)	1.4ha

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), Arable crop (BC1), Conifer plantation (WD4), Buildings and artificial surfaces (BL3), of low ecological value. Any direct or indirect impacts on these habitats are not significant. The effects on habitats that are identified as KERs are described in the sections and tables below.

¹⁷ NRA, 2010, *National Roads Authority - The Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads*, Online, Available at: <https://www.tii.ie/tii-library/environment/construction-guidelines/Management-of-Noxious-Weeds-and-Non-Native-Invasive-Plant-Species-on-National-Road-Schemes.pdf>, Accessed 09.12.2020

7.6.4.1.1 Assessment of Potential Effects on Rivers/Streams and Sensitive Aquatic Faunal Species

Table 7-15 Assessment of effects on Rivers/Streams 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 likely to occur downstream of the Proposed Development.</p> <p>The footprint of the Proposed Development has been specifically designed to avoid the large watercourses within the study area (i.e. all significant infrastructure has been located over 75 metres from EPA mapped watercourses), see Section 10.5.2.1, Chapter 10 ‘Water’ of the EIAR.</p> <p>As described in Chapter 4 of the EIAR, there are a total of 13. no. new and proposed upgraded water crossing, these include ‘2 no. new stream crossings and 6 no. existing stream crossing upgrades’ as part of access road construction and upgrades on the site. ‘In addition, a total of 3 no. existing crossings will be upgraded and 2 no. new crossings constructed on the proposed collector cabling route between the two turbine clusters and at the proposed new link road near Breeda Bridge’. The locations of the crossings are shown on Figure 4-7 and in the layout drawings in Appendix 4-1 of this EIAR. New ‘Watercourse crossings will be constructed using bottomless, pre-cast concrete structures, and avoid the requirement for in-stream works’. Therefore, there is no potential for the Proposed Development to result in any barrier to the movement of aquatic species. Only minor culvert upgrade works are proposed as described in Section 4.6.4.11 of the EIAR. Section 4.8.2.1, Chapter 4 of the EIAR presents further detail on the construction methodology that will be utilised for crossings. The measures minimise potential for impact on the receiving environment.</p> <p>There is potential for the construction activity to result in the run-off of silt, nutrients and other pollutants such as hydrocarbons and cementitious material into these watercourses. This could result from the removal of scrub and forestry, culverting of drainage ditches or the use of concrete and other construction materials. The Proposed Development will cross a number of small drainage ditches, which are not themselves ecologically sensitive but do provide connectivity to the larger watercourses that surround the site.</p> <p>In the absence of appropriate mitigation measures, the construction phase of the Proposed Development has the potential to result in indirect effect on aquatic receptors in the form of water pollution.</p> <p>The potential effects on water quality are fully described in Chapter 10 ‘Water’ of this EIAR and are specifically described here in relation 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 to have 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 the all new major infrastructure such as turbine bases and substation etc. are located over 75 metres 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 Development to result in a moderate significant indirect effect on the identified aquatic habitats and species at a local geographic scale in the form of pollution during the construction phase of the Proposed Development.</p>
<p>Mitigation</p>	<p>A detailed drainage maintenance plan for the Proposed Development is provided in Chapter 4, Section 4.6.8 of this EIAR with additional drainage details described in Section 4.6 generally. This plan provides details of how water quality will be protected during the construction of the Proposed Development. In addition to this, specific mitigation is provided in relation to water quality in Chapter 10: ‘Water’ of this EIAR, see Section</p>

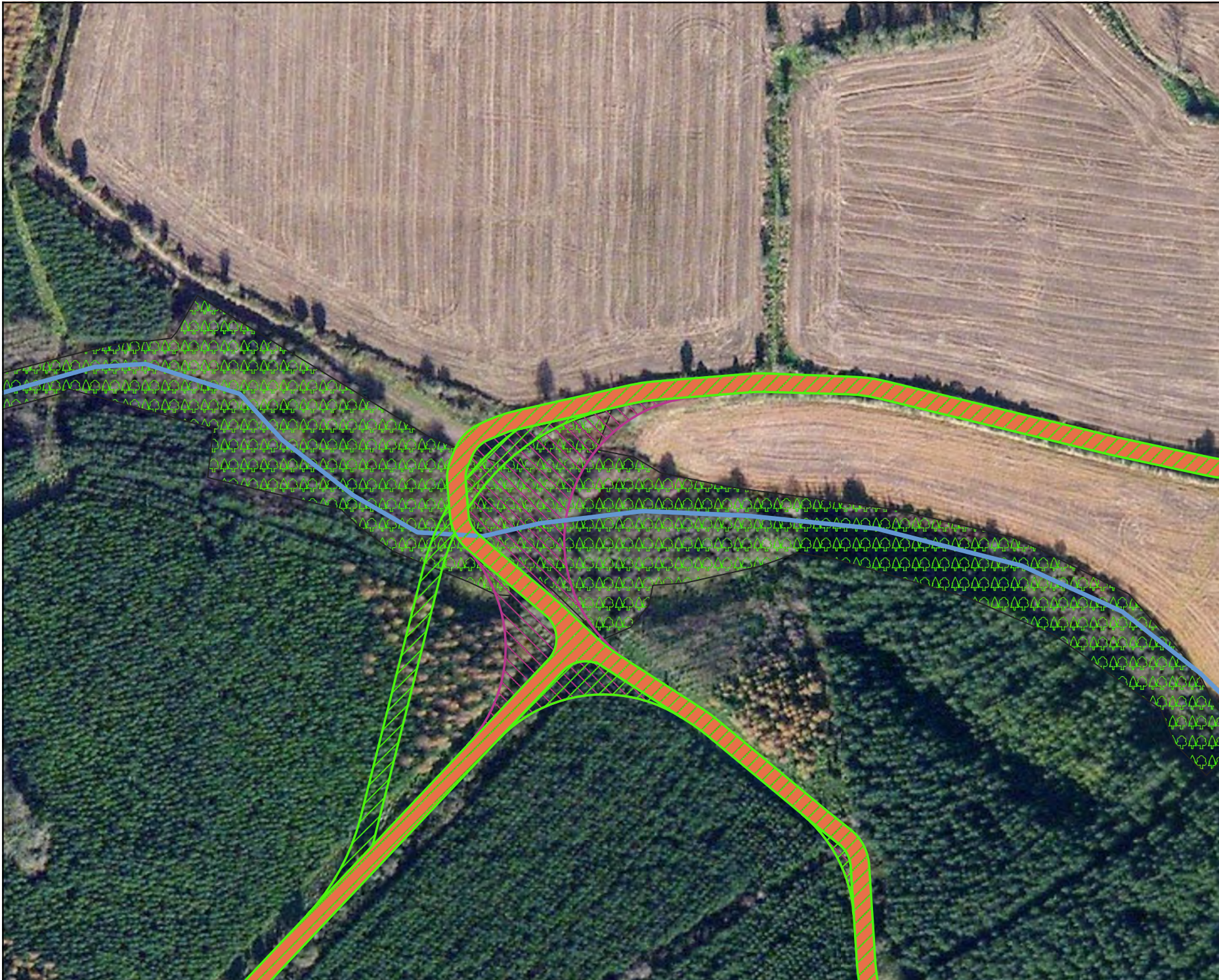
	<p>10.5.2. This provides specific mitigation for the proposed works including mitigation by avoidance, mitigation by design, tree felling, water treatment measures and surface water quality monitoring. As described above, Section 4.8.2.1, Chapter 4 of the EIAR presents further details on the construction methodology that will be utilised for all watercourse crossings.</p> <p>Section 10.5.2.8, Chapter 10 ‘Water’ of the EIAR also prescribes mitigation measures for the installation of the above-mentioned watercourse crossings. In addition, Section 10.5.2.8 of the EIAR also describes the methodology for the proposed collector cable route watercourse crossings. In summary, these are as follows:</p> <ul style="list-style-type: none"> ➤ Method 1 - Where no crossing culvert currently exists, the cable will pass over the watercourse on a new bottomless box culvert or pre-cast concrete slab in a standard trefoil arrangement; ethod 1 - Where no crossing culvert currently exists, the cable will pass over the watercourse on a new bottomless box culvert or pre-cast concrete slab in a standard trefoil arrangement; ➤ Method 2 - Where the required depth above the culvert to accommodate the standard trench is achieved in the road, the cabling will pass below the road surface; and, ➤ Method 3 - Where the required depth above the culvert to accommodate the standard trench cannot be achieved in the road, the cabling will pass over the culvert in a flatbed formation. ➤ Method 4 - In the event that none of the above methods are appropriate, directional drilling will be utilised. <p>The upgrade of existing access tracks and construction of new tracks will involve some works within 50m of watercourses and new watercourse crossings. However, no instream works are proposed, and a suite of measures are in place to avoid any adverse effects on watercourses. These measures are described in full in the Chapter 10 ‘Water’ of the EIAR.</p> <p>In addition, these and other measures are also fully included in the Construction Environmental Management Plan (CEMP) that is provided as Appendix 4-4 of this EIAR. These documents provide the details of exactly how the measures will be implemented during construction. Following the implementation of the site specific mitigation measures described in the EIAR for the proposed watercourse crossings, Chapter 10 ‘Water’ (see Section 10.5.2.8) concludes that ‘no significant effects on stream morphology or stream water quality will occur at crossing locations’.</p> <p>In addition to the above, Chapter 10 ‘Water’ also prescribes measures for the protection of water quality associated with the required forestry felling prior to construction, see Section 10.5.2.1.</p>
<p>Residual Effect following Mitigation</p>	<p>Following the implementation of mitigation, there will be no significant effect on aquatic habitats or species as a result of the Proposed Development at any geographic scale.</p>






7.6.4.1.2 Assessment of Potential Effects on Wet willow-alder-ash woodland (WN6)

A small area of Wet willow-alder-ash woodland (WN6), occurs within a short linear section of access track, associated with the installation of a watercourse crossing to the southwest of Turbine no. T7, see Figure 7-11. An assessment of the impacts on this habitat is provided in Table 7-16.

Table 7.16. Impacts on Wet willow-alder-ash woodland (WN6) during Construction

<p>Description of Effect</p>	<p>The proposed development will result in the loss of approximately 0.02ha of wet-willow-ash woodland at the location of the proposed upgrade of an existing watercourse crossing to southwest of Turbine no. T7.</p>
-------------------------------------	--



- ### Map Legend
-  Altered site layout for minimisation of footprint
 -  Existing access track
 -  Wet willow-alder-ash woodland (WN6)
 -  EPA mapped watercourse
 -  Original proposal requiring significant topographical alterations

Microsoft product screen shots reprinted with permission from Microsoft Corporation



Drawing Title
Woodland protection design measures

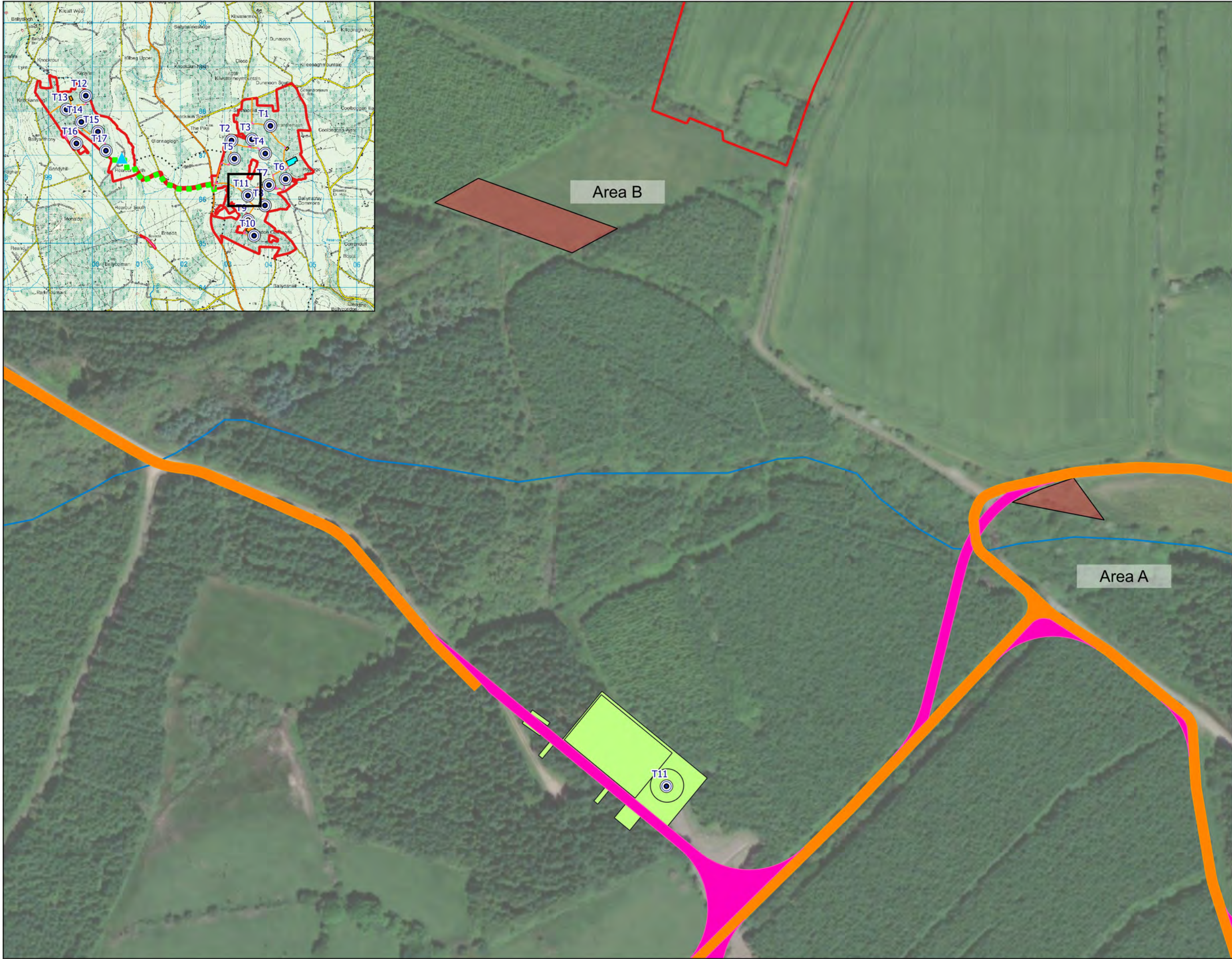
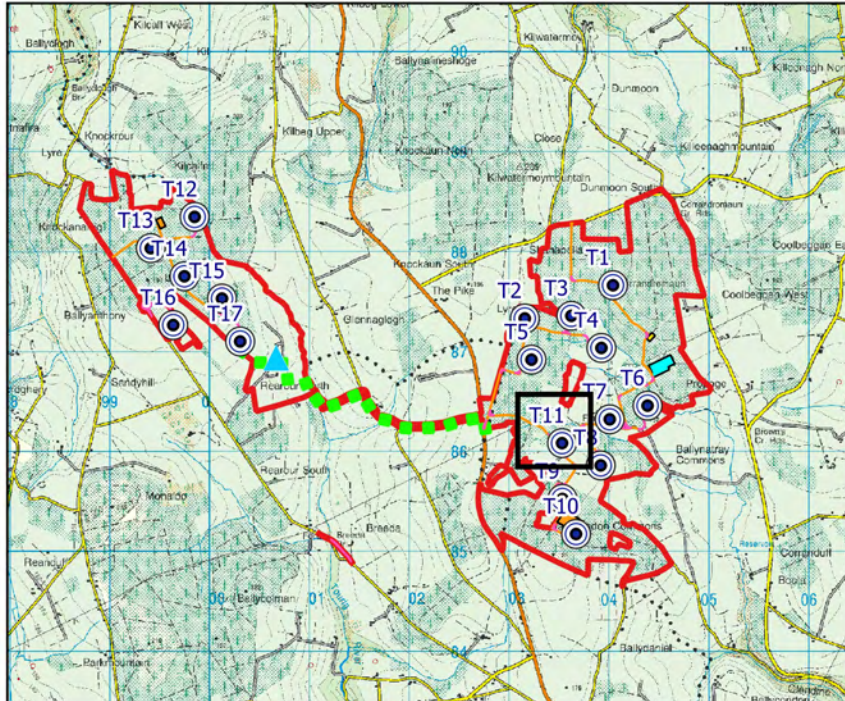
Project Title
Lyrenacarriga Wind Farm

Drawing By: DMN	Checked By: JH
Project No. 170749	Drawing No. Figure 7-11
Scale 1:1610	Date 10.12.20



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

<p>Characterisation of unmitigated effect</p>	<p>The loss of 0.02ha of wet willow-ash-alder woodland constitutes a permanent slight negative effect on this small area of habitat within the EIAR study area boundary. The habitat is common in the wider landscape where it occurs alongside exiting watercourses. It is of high local biodiversity value. It also contributes to the ecological and habitat connectivity throughout the site and within the wider area. The magnitude of this impact is considered to be moderate at the local scale but is not considered to be significant in a County, National or International context.</p>
<p>Assessment of Significance prior to mitigation</p>	<p>The loss of this small area (0.02ha) of wet willow-ash-alder woodland is a significant slight negative effect on a receptor of Local Importance (Higher Value) in the absence of mitigation.</p>
<p>Mitigation</p>	<p><u>Mitigation by avoidance, minimisation and design</u></p> <p>The original proposed road layout as designed would have resulted in a greater area of wet willow-ash-alder woodland being lost to the development footprint. Given the changes in elevation between the existing site track either side of the watercourse crossing and the base of the river, as well as the swing radius required to facilitate turbine delivery, the initial design required a greater linear distance of site access track within this habitat as well as substantial regrading works. Therefore, a number of alternative design options were considered to reduce the area of habitat loss, see Figure 7-11. The final layout design has resulted in the site access track moving into an area of highly modified coniferous plantation forestry to the west in order to reduce the turning/swing radius required for turbine delivery, and thus reducing the area of wet woodland loss required.</p> <p>Prior to the commencement of construction works on site, the extent of the proposed infrastructure at this location will be marked out by the project engineer and project ecologist. The area will be clearly fenced of and appropriate fencing erected. This will further minimise any potential for unnecessary habitat loss. If required, limb removal of individual branches will be undertaken, under the provisions of the Wildlife Act, as a preference to the loss of the entire tree. Such measures would allow for regrowth following turbine delivery.</p> <p><u>Offsetting planting</u></p> <p>In order to offset for the loss of wet willow-alder-ash woodland, it is proposed to plant approximately 0.06ha of alder, willow and birch saplings. The area identified for replanting is greater than that to be lost as the new woodland planting will take time to establish. The area in which the proposed planting will be located will be subject to final landowner agreement. However, indicative areas for planting are proposed in Figure 7-12. Therefore, there will be no net loss of wet-willow-alder ash woodland in the development footprint. In addition, the woodland will be replanted in locations where they increase/bolster habitat connectivity to the wider landscape.</p>
<p>Residual Effect following Mitigation</p>	<p>Following the implementation of the offsetting measures as described above, there will be a short-term loss of 0.02ha of wet willow-alder-ash woodland and its immediate replacement with 0.06ha of young wet woodland. This will result in an overall increase of alder, willow and birch woodland on the site as a result of this proposed development and no long-term loss of habitat connectivity.</p> <p>There is will be no long-term significant residual effect .</p>



Map Legend

- Site Boundary
- Proposed 110kV Substation
- Proposed Turbine
- Proposed Met Mast
- Proposed Borrow Pit
- Collector Cabling Route
- Proposed Compound
- Proposed New Road
- Existing Road Proposed for Upgrade
- Proposed Wet Woodland Planting Areas

Microsoft product screen shots reprinted with permission from Microsoft Corporation

Drawing Title	
Proposed Wet Woodland Planting Areas	
Project Title	
Lyrenacarriga Wind Farm	
Drawn By	Checked By
H Witter	D McNicholas
Project No.	Drawing No.
170749	Figure 7.12
Scale	Date
1:2000	2020.11.06

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

7.6.4.1.3 Assessment of Potential Effects on Hedgerows and Treelines

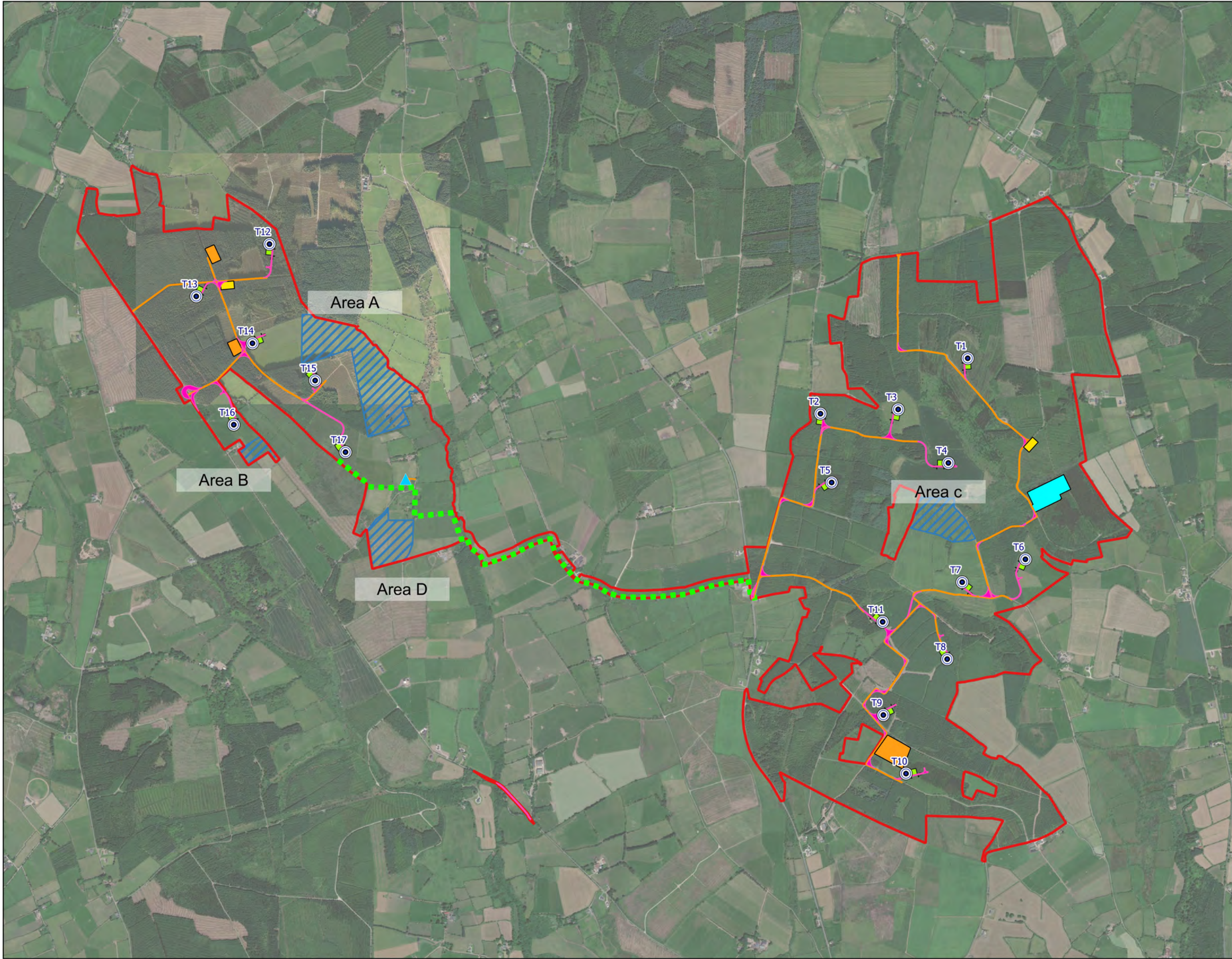
Table 7-17 Assessment of effects in relation to Hedgerows and Treelines

Description of Effect	The proposed development will result in the loss of approximately 236 metres of hedgerow as a result of the proposed development. This is predominantly associated with the incorporation of mitigation for bats around each turbine in order to reduce their occurrence in close proximity to the turbines, and ultimately to avoid mortality.
Characterisation of unmitigated effect	The loss of 236 metres of hedgerow constitutes a permanent negative effect on these habitats respectively. This would be reversible following the decommissioning of the proposed development.
Assessment of Significance prior to mitigation	In the absence of mitigation, the loss of these linear landscape features is considered to be a long-term slight significant effect on a receptor of Local Importance (Higher Value) at the local geographic scale only. This not considered to be significant at any other geographic scale.
Mitigation	In order to offset for the loss of hedgerow and treeline habitat to the proposed development (predominantly associated with bat mitigation measures), it is also proposed to plant 236 linear metres of new hedgerow within large areas of agricultural/arable lands to increase connectivity locally. The locations in which the proposed planting will be located will be subject to final landowner agreement. However, indicative areas for planting are proposed in Figure 7-13. The species composition will be similar to that in the surrounding landscape i.e. hawthorn, blackthorn and semi-mature native tree species. There will therefore be no net loss in hedgerow or treeline habitat. In addition, connectivity to the wider landscape will be maintained around turbines where hedgerows and treelines are retained.
Residual Effect following Mitigation	Following the implementation of the mitigation described above, there will be a short-term loss of hedgerow and treeline. Following completion of construction works, this will be replaced with linear features of planted hedging and semi-mature trees. There will be no significant residual effect on linear landscape features at any geographic scale as a result of this development.

7.6.4.2 Effects on Protected 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 which were not included as KERs. Given the extensive area of habitat that will remain undisturbed throughout the site and the avoidance of the most significant areas of faunal habitat (i.e. natural woodlands and watercourses), no significant effects on non-KER faunal biodiversity is anticipated as a result of the proposed development.

It should be noted that no significant habitat for salmonids, lamprey, coarse fish, white-clawed crayfish, European eel, aquatic invertebrates or other aquatic species was recorded within the footprint of the proposed development and all major infrastructure has been designed to avoid direct impact on watercourses. 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 7.6.4.1.1 above and is not repeated below.



Map Legend

- Site Boundary
- Proposed 110kV Substation
- Proposed Turbine
- ▲ Proposed Met Mast
- Proposed Borrow Pit
- Collector Cabling Route
- Proposed Compound
- Proposed New Road
- Existing Road Proposed for Upgrade
- Indicative hedgerow planting area

Microsoft product screen shots reprinted with permission from Microsoft Corporation



Proposed Hedgerow Planting Areas	
Project Title	
Lyrenacarriga Wind Farm	
Drawn By	Checked By
H Witter	D McNicholas
Project No.	Drawing No.
170749	Figure 7.13
Scale	Date
1:20000	2020.12.14

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

7.6.4.2.1 Assessment of Potential Effects on Badger

Table 7-18 Assessment of Potential Impacts on Badger

<p>Description of Effect</p>	<p>Whilst badger setts and foraging activity were recorded within the study area, the proposed development has been specifically designed to avoid all identified setts. There is some potential for small scale loss of foraging habitat to facilitate the construction footprint.</p> <p>In the absence of mitigation, there is potential to result in disturbance/displacement during the construction phase of the proposed development. In addition, construction works in close proximity to the sett could prevent badgers from occupying the sett.</p>
<p>Characterisation of unmitigated effect</p>	<p>Given the small scale of the development footprint in comparison to the size of the study area, the loss of foraging habitat to the footprint of the proposed development constitutes a Permanent Slight Negative Effect. This would not be reversible as it is within the construction footprint. The proposed development will not result in any fragmentation of badger habitat, as there will be no barriers to movement throughout the site as a result of the proposed works.</p> <p>The identified badger sett is located in excess of 215 metres from the proposed development footprint at its closest. At this location, the proposed works involve the construction/upgrade of an existing access track to Turbine T5 to the northwest as well as the construction of Turbine T5 to the north. The proposed infrastructure is separated from the identified sett by existing mature conifer plantation forestry dominated by Sitka spruce. Given the separation in distance between the proposed infrastructure and the identified badger sett, following the precautionary principal, there is potential for short term slight negative effects on the local badger population in terms of disturbance, displacement and potentially mortality in the absence of mitigation.</p>
<p>Assessment of Significance prior to mitigation</p>	<p>There is no potential for significant loss of badger habitat as a result of the proposed development at any geographic scale.</p> <p>In the absence of mitigation, there is potential for significant disturbance/displacement on the local badger population as a result of the proposed development.</p> <p>There is no potential for significant effects at a county, national or international scale.</p>
<p>Mitigation</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:</p> <ul style="list-style-type: none"> ➤ On a precautionary basis, a pre-commencement badger survey will be undertaken in accordance with standard best practice guidance (TII, 2005) prior to the commencement of site works to confirm the conditions predicted in this EIAR. If a badger sett is identified within or immediately adjacent to the proposed development footprint, a badger sett disturbance licence will be sought from the National Parks and Wildlife Service. ➤ Exclusion zone fencing/berm and appropriate signage will be put in place along the section of haul road, where an existing cul-de-sac forestry spur road could provide vehicular access closer to the identified badger sett. This existing forestry access track will therefore be closed to any vehicular traffic/parking during the construction phase to avoid any unnecessary storage of vehicles etc . ➤ All of the above works will be undertaken or supervised by an appropriately qualified ecologist in advance of construction.
<p>Residual Effect following Mitigation</p>	<p>Following the implementation of the mitigation as described above and the separation in distance between the proposed infrastructure (particularly Turbine no. T5), there is no potential for any significant negative effect on badger at any geographic scale.</p>

7.6.4.2.2 Assessment of Potential Effects on Otter

Table 7-19 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 at the site including internal access tracks. Consequently, the Proposed Development footprint is dominated by modified habitats associated with the existing infrastructure conifer plantation, agricultural grassland and arable crops.</p> <p>Potential for effects on otter has been considered with regard to NPWS ‘Threat Response Plan’¹⁸ (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 the Tourig River (to the south of the proposed collector cable route), see Figure 7-8. As described in Section 7.6.4.1.1, there will be ‘2 no. new stream crossings and 6 no. existing stream crossing upgrades’ as part of access road construction and upgrades on the site. The locations of the crossings are shown on Figure 4-7 and in the layout drawings in Appendix 4-1 of this EIAR. New ‘Watercourse crossings will be constructed using bottomless, pre-cast concrete structures, and avoid the requirement for in-stream works’. Therefore, there is no potential for the Proposed Development to result in any barrier to the movement of aquatic species, including otter. 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. Turbine locations have been selected to avoid natural watercourses (located over 75 metres from EPA mapped watercourses). Only minor culvert upgrade works are proposed. Therefore, there is no potential for the Proposed Development to result in any barrier to the movement of otter.</p> <p>It is assumed that otter occur in the EIAR study area on occasion, particularly the lower reaches of the main watercourses. There is potential for the construction activity to result in the run-off of silt, nutrients 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>Significant effects regarding habitat destruction, barrier effect, disturbance and mortality are not anticipated.</p> <p>In the absence of mitigation, the indirect effect of water pollution on otter during construction has the potential to be a short-term reversible impact. The magnitude of any such impact is likely to be at worst moderate, given that extensive infrastructure already exists at the site and that the majority of new infrastructure such as turbine bases, substation and construction compounds are located over 75 metres from any significant watercourse.</p>

¹⁸ NPWS (2009) Threat Response Plan: Otter (2009-2011). National Parks & Wildlife Service, Department of the Environment, Heritage & Local Government, Dublin.

<p>Mitigation</p>	<p>As otter occur within the study area, taking the precautionary principal, a pre-commencement otter survey will be undertaken upstream and downstream of all proposed watercourse crossings/culvert upgrades.</p> <p>The following measures will be undertaken for the avoidance of disturbance/displacement and direct mortality, and to ensure that no otter holts/breeding sites have been established since the original surveys undertaken:</p> <ul style="list-style-type: none"> ➤ From a precautionary basis, a pre-commencement otter survey will be undertaken in accordance with standard best practice guidance prior to the commencement of site works. In the unlikely event that an otterholt is identified within or immediately adjacent to the proposed development footprint, consultation will be undertaken with the National Parks and Wildlife Service and a derogation licence applied for. ➤ All conditions of a derogation licence will be implemented in full. ➤ No works should be undertaken within 150m of any holts at which breeding females or cubs are present. ➤ No wheeled or tracked vehicles (of any kind) should be used within 20m of active, but non-breeding, otter holts. Light work, such as digging by hand or scrub clearance should also not take place within 15m of such holts, except under licence (TII, 2006¹⁹). <p>All of the above works will be undertaken or supervised by an appropriately qualified ecologist.</p> <p>In order to avoid any potential for indirect effects on otter, via deterioration in water quality, a detailed drainage maintenance plan for the Proposed Development is provided in Section 4.6.8 of this EIAR. Additional drainage details described in Section 4.6 Chapter 4 of the EIAR generally. This plan provides details of how water quality will be protected during the construction of the Proposed Development. In addition to this, specific mitigation is provided in relation to water quality in Chapter 10: ‘Water’ of this EIAR, see Section 10.5.2. This provides specific mitigation for the proposed works including mitigation by avoidance, mitigation by design, tree felling, water treatment measures and surface water quality monitoring. As described above, Section 4.8.2.1, Chapter 4 of the EIAR presents further details on the construction methodology that will be utilised for all watercourse crossings. Section 10.5.2.8, Chapter 10 ‘Water’ of the EIAR also prescribes mitigation measures for the installation of the above-mentioned watercourse crossings. In addition, Section 10.5.2.8 of the EIAR also describes the methodology for the proposed collector cable watercourse crossings. Following the implementation of the site specific mitigation measures described in the EIAR for the proposed watercourse crossings, Chapter 10 ‘Water’ (see Section 10.5.2.8) concludes that ‘<i>no significant effects on stream morphology or stream water quality will occur at crossing locations</i>’.</p>
<p>Residual Effect following Mitigation</p>	<p>Following the implementation of mitigation, any effects on otter will be negligible and will not result in any significant effect greater than the local geographic scale.</p>

¹⁹ NRA, 2006. *Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes*. Dublin: Transport Infrastructure Ireland. Available at: www.tii.ie/tii-library/environment/construction-guidelines/Guidelines-for-the-Treatment-of-Otters-prior-to-the-Construction-of-National-Road-Schemes.pdf

7.6.4.2.3 Assessment of Potential Effects on Bats

Table 7-20 Assessment of Potential Impacts on Bats

<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 at the site including internal access tracks. Consequently, the Proposed Development footprint is dominated by modified habitats including conifer plantation.</p> <p>As per SNH 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 study area has been utilised to predict the potential effects of the proposed development on bats.</p> <p>Bat surveys undertaken in 2019 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 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 development is predominantly located within a Commercial forestry, agricultural grasslands and linear landscape features such as hedgerows and treelines have been largely avoided.</p> <p>To comply with SNH recommendations in relation to habitat buffering to avoid bat fatalities, there is a requirement to remove approximately 236m of hedgerow in proximity to Turbine 7 (Figure 5-1 in appendix 7.2 bat report). In relation to commuting bats locally, this loss is not considered to be significant as there is an extensive network of linear landscape features in the general area that will be fully retained. Consequently, there will be no significant habitat fragmentation, loss of commuting habitat or loss of foraging habitat associated with the buffering requirement.</p> <p>In addition, the opening up of conifer forestry plantations to facilitate turbine construction will also result in a net gain in linear landscape features available for foraging and commuting bats.</p> <p>No significant effects with regard to loss of commuting and foraging habitat are anticipated.</p> <p>Loss of, or damage to, roosts</p> <p>The development is predominantly located within commercial forestry and agricultural land. No bat roosts were recorded on site.</p> <p>No roosting sites suitable for maternity colonies, swarming or hibernation will be impacted by the proposed development.</p> <p>No significant effects with regard to loss of, or damage to, roosts are anticipated.</p> <p>Displacement of individuals or populations</p> <p>The development is predominantly located within a commercial forestry and agricultural land. In the absence of mitigation, the loss of 236 linear metres of hedgerow features is considered to be a long-term slight negative effect. This is considered to be significant at the local geographic scale only.</p>

	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.
Assessment of Significance prior to mitigation	No significant effects with regard to loss of commuting and foraging habitat are anticipated. No significant effects with regard to loss of, or damage to, roosts are anticipated. No significant displacement of individuals or populations is anticipated.
Mitigation	The development is predominantly located in plantation forestry (WD4) and some improved agricultural grassland (GA1) and linear landscape features such as hedgerows and treelines have been largely avoided. Although no significant effects are anticipated, it is proposed to offset hedgerow loss by planting additional hedgerow to ensure that there is a net gain in linear landscape features in the local area, see Figure 7-13. As described in Section 7.6.4.1.3, the locations in which the proposed planting will be located will be subject to final landowner agreement. In addition, the opening of conifer forestry plantations to facilitate turbine construction will result in a net gain in linear landscape features available for foraging and commuting bats. Full detail of mitigation for bat is provided in the Bat Report (Appendix 7.2)
Residual Effect following Mitigation	There is no potential for the construction of the Proposed Development to result in significant effects on the local bat population at any geographic scale.

7.6.4.2.4 Assessment of Potential Effects on Marsh Fritillary

Table 7-21 Assessment of Potential Impacts on Marsh fritillary

Description of Effect	Habitat Loss/ Fragmentation Small areas of scattered marsh fritillary habitat occur within the study area boundary. This is largely confined to roadside verges or alongside some forestry access tracks. No extensive areas of suitable habitat were recorded. These areas are shown in Figure 7-9 of this Chapter. The Proposed Development has been deliberately designed to avoid the only recorded marsh fritillary colony, located at a road junction northwest of T16. There are, however, some works proposed close to this identified marsh fritillary habitat and associated colony. If the works area is not clearly defined and the areas of marsh fritillary habitat not fenced off and avoided in advance of the construction works, taking a precautionary approach, there could be some potential for direct impact.
Characterisation of unmitigated effect	In the absence of mitigation/best practice, there is potential for Long-term Slight Negative Effect through the loss of potentially suitable supporting habitat and marsh fritillary larval webs. This receptor has been assessed as of local importance (higher value). In the absence of appropriate site setup, the effects would be slight at worst, as the entire development has been designed to avoid these population.
Assessment of Significance prior to mitigation	Given the design of the scheme, there is no potential for the construction of the Proposed Development to result in significant effects on marsh fritillary as the footprint of the development avoids the marsh fritillary colony identified within the EIAR study area. However, mitigation will be employed to ensure that there is no temporary habitat loss or degradation effects on this species at all.
Mitigation	In order to avoid any potential for impact on the recorded marsh fritillary colony on site (comprising of two individual larval webs), the existing forestry access track will be retained and the proposed site access track has been altered to avoid this area by means of a 'bell

shaped’ site entrance track from the main road. In addition, a second option has also been proposed which involves a different junction alteration to the northeast of the existing access track. Both options fully avoid the recorded marsh fritillary population. Whilst it is highly unlikely that the onsite population of marsh fritillary will be impacted during construction, due to the avoidance of the recorded colony, measures that have been put in place to protect the species. In addition, the existing site access track will be blocked to vehicular access at both the existing main road and the junction with the proposed new roads. This will be achieved by the installation of earthen berms, see Figure 7-14. This thereby avoids any remote potential for effects on the population.

Best practice measures for the protection and enhancement of the supporting habitat within the Proposed Development site include:

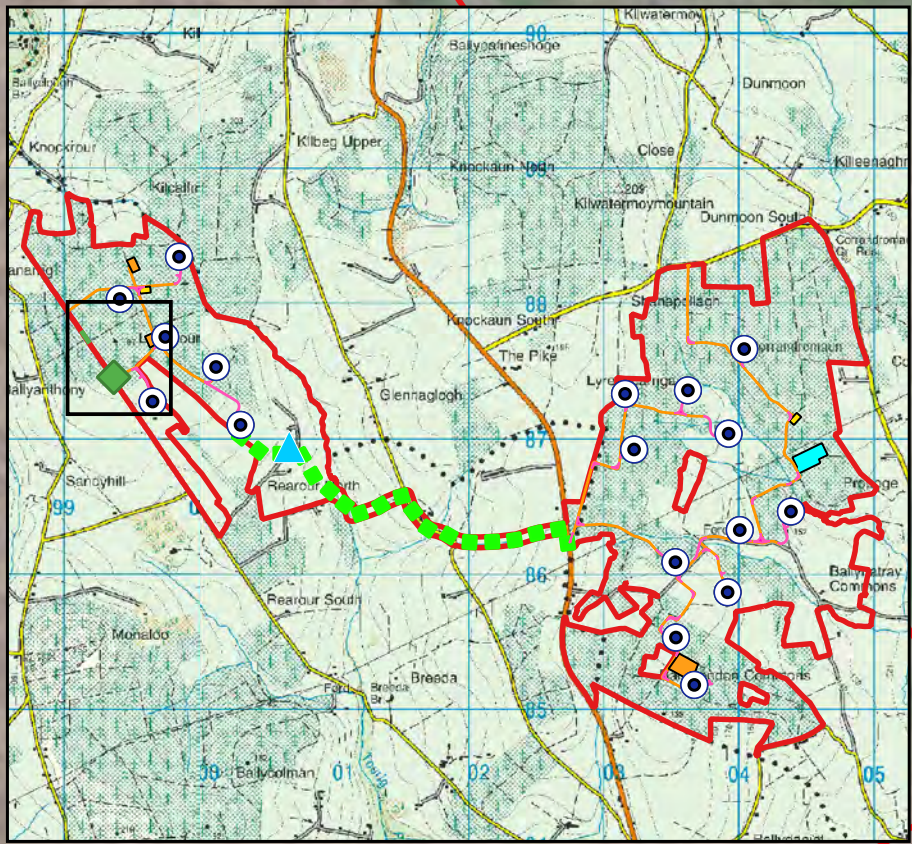
- **Avoidance Measures:** The entire Proposed Development has been designed to avoid marsh fritillary and supporting habitat on site.
- **Pre-construction Measures:** Area of suitable marsh fritillary habitat and associated colony will be fenced off or clearly marked prior to the commencement of any site works under the guidance and supervision of a suitably qualified Ecological Clerk of Works (ECoW). This is particularly important where the site access track, northwest of T16, occurs in close proximity to the only recorded colony (see Plate 7-25). Although the access track is located within forestry, given the close proximity of the proposed site access road at this location, protection measures are required through fencing.
- Pre-commencement surveys will be undertaken for marsh fritillary to determine long term trends of the population within the site
- Vegetation structure and suitability will be monitored following the NBDC survey methodology (NBDC, 2020).
- Habitat condition monitoring will be undertaken during construction and in year 1 post construction to ensure that there are no negative effects on marsh fritillary habitat.



Plate 7-25 Example of forestry access track meeting junction with local road, northwest of T16, and associated marsh fritillary habitat (left). This area, including the opposite verge, will be fenced off in advance of any site works to ensure no potential for impact.

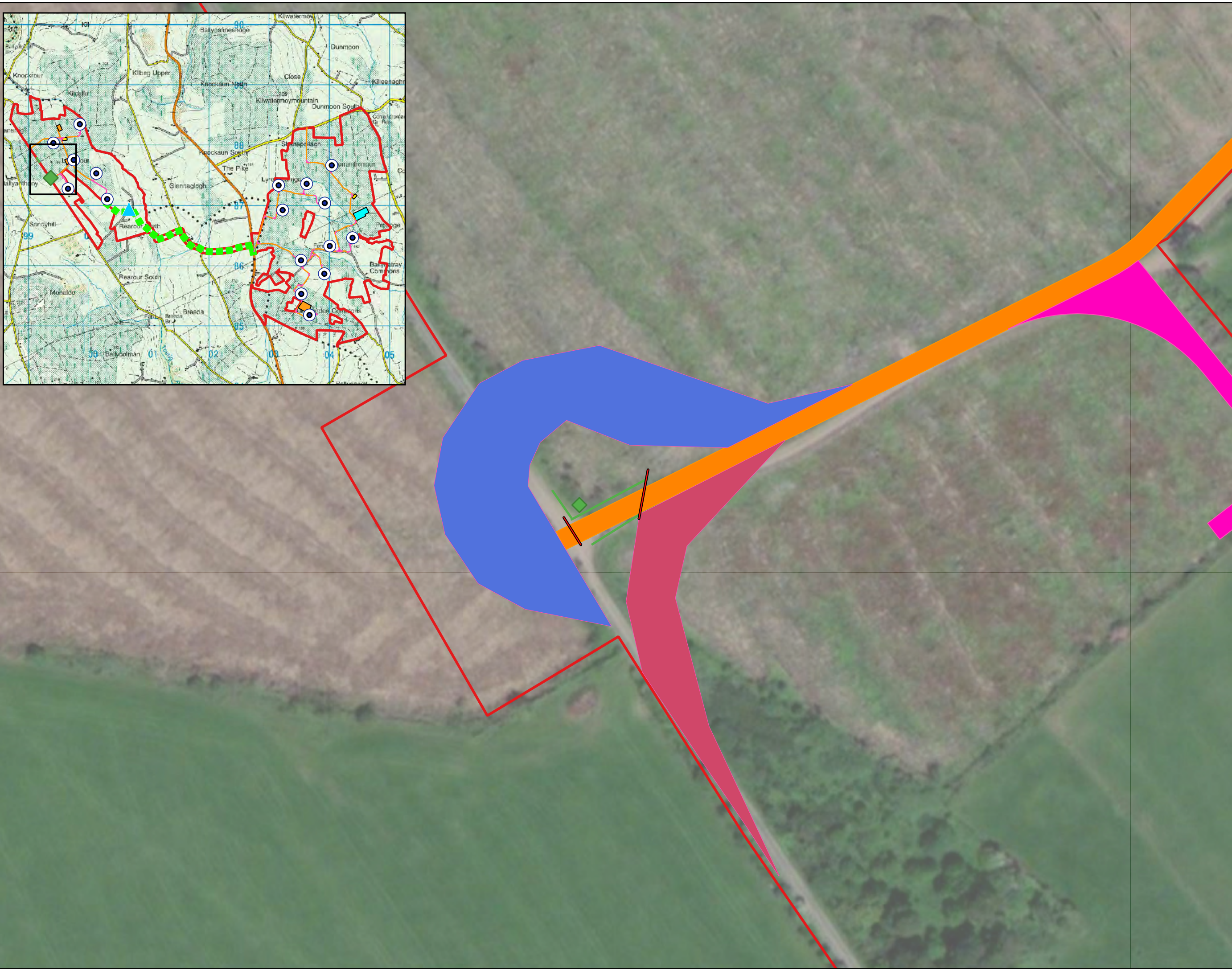
Residual Effect following Mitigation

Following the incorporation of the above avoidance and mitigation measures, no potential for significant effect on marsh fritillary has been identified. There is the potential for the Proposed Development to increase the extent of available habitat on the site for marsh fritillary and also to increase the quality of the habitat on the site.



Map Legend

- Site Boundary
- Proposed New Road
- Existing Site Access Track
- ◆ Marsh Fritillary Record 2018
- Suitable Marsh Fritillary Habitat
- Junction Layout Option 1
- Junction Layout Option 2
- Proposed Protective Berms



Microsoft product screen shots reprinted with permission from Microsoft Corporation
Ordnance Survey Ireland Licence No. AR 0021820 © Ordnance Survey Ireland/Government of Ireland

Drawing Title
Marsh Fritillary Protection Measures

Project Title
Lyrenacarriga Wind Farm

Drawn By H Witter	Checked By D McNicholas
-----------------------------	-----------------------------------

Project No. 170749	Drawing No. Figure 7-14
------------------------------	-----------------------------------

Scale 1:1000	Date 2020.11.06
------------------------	---------------------------

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

7.6.5 Likely Significant Effects During Operational Phase

7.6.5.1 Effects on Habitats during Operation

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

Potential for effects on rivers, streams and sensitive aquatic species remains a KER during operation and is assessed in detail in the following subsections.

7.6.5.1.1 Effects on Rivers and Streams, and Sensitive Aquatic Faunal Species

Table 7-22 Assessment of Potential Impacts on Rivers, Streams, and Sensitive Aquatic Faunal Species

<p>Description of Effect</p>	<p>Note: Whilst this impact assessment is in the habitats section, it also assesses the impact of the Proposed Development on aquatic species including salmonids, lamprey, white-clawed crayfish, European eel, aquatic invertebrates and other aquatic species. The Proposed Development will have no direct impact on the aquatic habitat of these species and there is no potential for disturbance. The only pathway for effect to occur is as a result of water pollution and this is discussed in this section in relation to habitats and species.</p> <p>The increased amount of hard standing associated with the Proposed Development infrastructure has, in the absence of mitigation, the potential to result in faster water run-off from the site to the surrounding watercourses. This may have the indirect effect of causing erosion, which could lead to deterioration of surface water and supporting habitat quality. Additionally, there is the potential for the faster run-off of any pollutants that may be associated with vehicular usage on the site.</p> <p>These impacts on water quality are fully described in Chapter 10: ‘Water’ of this EIAR and are described here in relation specifically to biodiversity.</p>
<p>Characterisation of unmitigated effect</p>	<p>Impact on water quality during the operational phase of the Proposed Development has been assessed as a permanent negative effect in the absence of mitigation. The magnitude of this impact is slight because all major infrastructure will be located over 75 metres from any significant watercourse (those mapped by the EPA²⁰ and downloaded to GIS) and the footprint of the Proposed Development will be minimal when compared to the overall size of the site.</p>
<p>Assessment of Significance prior to mitigation</p>	<p>Significant effects on water quality are not anticipated at any geographic scale during the operation of the Proposed Development. However, mitigation will be employed to ensure that there will be no negative effects on sensitive aquatic receptors at all.</p>
<p>Mitigation</p>	<p>Whilst no significant effects on water quality are anticipated during the operational phase of the Proposed Development, any potential for effects on water quality associated with the operational phase drainage of the site has been fully mitigated through appropriate design and mitigation as fully described in Section 10.5.3, Chapter 10: ‘Water’ and within the accompanying CEMP.</p>
<p>Residual Effect following Mitigation</p>	<p>No potential for significant effect has been identified at any geographic scale as a result of the Proposed Development.</p>

²⁰ EPA, 2020, Online Map viewer. Available at: <https://gis.epa.ie/EPAMaps/>

7.6.5.2 Effects on Fauna during Operation

The operation of the Proposed Development will not result in any additional habitat loss or deterioration.

There is no potential for significant negative effects on terrestrial fauna such as otter, marsh fritillary or badger that was identified as a KER during the construction phase of the development.

It should be noted that no significant habitat for salmonids, lamprey, freshwater pearl mussel, white-clawed crawfish, European eel, or other aquatic species was recorded within the footprint of the Proposed Development and all new major infrastructure such as turbine bases are located over 75 metres from the watercourses within the site. 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 7.6.4.1.1 and is not repeated below.

The operation of the Proposed Development will not have any effect on marsh fritillary or habitat for the species. No elements of the infrastructure are located on suitable marsh fritillary habitat and no maintenance works associated with the operation of the Proposed Development are proposed in any such habitat.

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 suitable watercourses. In addition, all turbines are located over 75 metres from EPA mapped watercourses.

Potential for effects on bat species resulting from the operation of the Proposed Development was identified and therefore, these taxa are discussed and assessed in relation to the operational phase below.

7.6.5.2.1 Assessment of Potential Effects on Bats during operation

Table 7-23 Assessment of Potential Impacts on Bats during operation

<p>Description of Effect</p>	<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 7.2, found bat species composition and abundance to be typical of the geographic location, as well as the largely afforested nature of the study area, containing some open agricultural lands.</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 high collision risk species mortality due to collision. The magnitude of this effect in the absence of mitigation is moderate on the basis that no significant roosts were identified in the immediate vicinity of the turbines and the median level of activity is considered moderate (on a precautionary basis).</p> <p>It is noted in the SNH (2019) guidelines 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. Therefore, continued monitoring of operational wind farms for three years' post construction is recommended in the guidelines and will be undertaken at this site, to determine the actual, post construction effects on the local bat populations.</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.</p>

Mitigation	<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. Details of this mitigation and how it is calculated is provided in Appendix 7.2.</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. This will provide data and information on the actual recorded impact of the wind turbines on the local bat populations. Full details of the proposed monitoring programme are provided in Appendix 7.2, and includes measurement of bat activity, weather conditions and any correlation between the two. The monitoring will also include corpse searching in the areas surrounding the turbines to gather data on any actual collisions.</p> <p>If, following monitoring, there are significant effects recorded, a range of measures are proposed to ensure that any such effects are fully mitigated. These measures include blade feathering, curtailment of turbines during certain conditions and increase of buffers surrounding the turbines. Any or all of the above measures may be employed following actual monitoring of the impact of the operating turbines on bats to ensure that no potential for significant effects on bat species remains.</p>
Residual Effect following Mitigation	<p>Following the implementation of the monitoring and mitigation described above, there is no potential for significant residual effects on bat species.</p>

7.6.6 Likely Significant Effects During Decommissioning phase

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

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 fulfilment of planning requirements , or the Proposed Development may be decommissioned fully. The proposed substation would form part of the national grid and thus remain.

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 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 could be in use for purposes other than the operation of the development by the time the decommissioning of the Proposed Development is to be considered, and therefore it may be more appropriate to leave the site roads in situ for future use. It is envisaged that the roads will provide a useful means of extracting the commercial forestry crop which exists on the site. If it were to be confirmed that the roads were not required in the future for any other useful purpose, they could be removed where required.

The electrical cabling between the windfarm and the substation will be removed from the underground cable ducting at the end of the useful life of the renewable energy development. The cable ducting will be left in-situ as it is considered the most environmentally prudent option, avoiding unnecessary excavation and soil disturbance for an underground element that is not visible.

A Decommissioning Plan has been prepared (Appendix 4-4) the detail of which will be agreed with the local authority prior to any decommissioning. The Decommissioning Plan will be updated prior to the end of the operational period in line with decommissioning methodologies that may exist at the time and will 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. As noted in the Scottish Natural Heritage report (SNH) Research and Guidance on Restoration and Decommissioning of Onshore Wind Farms (SNH, 2013) reinstatement proposals for a wind farm are made approximately 30 years in advance, so within the lifespan of the wind farm, technological advances and preferred approaches to reinstatement are likely to evolve.

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 existing site roads would be used during decommissioning. The redundant underground cables onsite 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 is contained in the CEMP, Appendix 4-4 of this EIAR. The CEMP for the Proposed Development provides the 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 10: '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.

7.7

Cumulative Impact Assessment

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 6.6.5 of this report, including European Sites & Nationally Designated Sites. This included a review of online Planning Registers and served to identify past, present and future plans and projects, their activities and their predicted environmental effects. The projects considered are listed in Chapter 2: Background of the Proposed Development.

7.7.1

Assessment of Plans

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

- > Waterford County Development Plan 2011 – 2017
- > Cork County Development Plan 2014
- > National Biodiversity Action Plan 2017-2022
- > The Regional Planning Guidelines for the South East 2010-2022

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 7-24.

European sites are considered in the Natura Impact Statement that accompanies this application.

Table 7-24 Review of plans and policies

Plans	Key Policies/Issues/Objectives Directly Related To European Sites, Biodiversity and Sustainable Development In The Zone of Influence	Assessment of development compliance with policy
<p>Waterford County Development Plan 2011 - 2017</p>	<p>The County Council have a number of objectives relating to the protection, conservation and restoration natural heritage sites including specific objectives relating to the Natura 2000 network.</p> <p><i>It is an objective of the plan to protect European sites that form part of the Natura 2000 network and for proposed developments to pose no loss of protected habitats and species during the lifetime of the Plan. The no./percentage of developments in/near Natura 2000 network is to be monitored and recorded kept on the percentage of qualifying interest features which have achieved their specific objectives of maintenance or restoration.</i></p> <p><i>It is the policy of the Council to facilitate new development with no compromise in the favourable conservation condition of European sites. No compromise or impact on the achievement of the favourable conservation condition objectives (whether maintain or restore) of European sites. Designation of additional areas due to biodiversity and/or geological value. Percentage of unique habitats and species lost in designated sites through trending of annual surveys.</i></p> <p><u>Natural Heritage and Biodiversity Policies and Objectives</u></p> <p><i>Objective CP3:</i> <i>To recognise the value of the County’s natural coastal defences including estuaries, dunes and sand dunes and ensure their protection.</i></p> <p><i>Policy NH2:</i> <i>To conserve, manage and enhance the natural heritage, biodiversity, landscape and environment of County Waterford in recognition of its importance as a non-renewable resource, the unique identity and character of the County and as a natural resource asset.</i></p> <p><i>Policy NH3:</i> <i>To ensure as far as possible that development does not impact adversely on wildlife habitats and species. In the interests of sustainability, biodiversity should be conserved for the benefit of future generations.</i></p> <p><i>Policy NH4:</i> <i>To protect plant, animal species and habitats which have been identified by the Habitats Directive, Bird Directive, Wildlife Act (1976) and Wildlife (Amendment) Act 2000 and the Flora Protection order S.I. No. 94 of 1999.</i></p>	<p>The Development plan was comprehensively reviewed, with particular reference to Policies and Objectives that relate to 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 is located outside of any Nationally Designated Sites, as described in Section 7.5.1.1. No potential for negative cumulative impacts when considered in conjunction with the current proposal were identified. No developments or projects identified within the Development Plan were found to occur in the wider area surrounding the Proposed Development.</p>

Plans	Key Policies/Issues/Objectives Directly Related To European Sites, Biodiversity and Sustainable Development In The Zone of Influence	Assessment of development compliance with policy
	<p>Policy NH6: To conserve the favourable conservation status of species and habitats within Special Areas of Conservation and Special Protection Areas.</p> <p>Policy NH9: To ensure that development proposals in areas identified as being of nature conservation value will not impact adversely on the integrity and habitat value of the site.</p> <p>Policy NH10: To protect and conserve pNHAs and NHAs in the County.</p> <p>Policy NH15: To maintain good ecological status of wetlands and watercourses in support of the provisions of the Water Framework Directive and Ramsar Convention.</p> <p>Policy NH16: The preservation of riparian corridors is a requirement for the protection of aquatic habitats and facilitation of public access to waterways. No development shall take place within a buffer zone of 15m measured from the top of the riverbank.</p> <p>Objective NH3: To protect riparian habitats along watercourses by maintaining an ecological buffer zone of at least 15m from the top of the watercourse riverbank. The Council will consult with the Fisheries Authority on the establishment and protection of riparian habitats where appropriate.</p>	

Plans	Key Policies/Issues/Objectives Directly Related To European Sites, Biodiversity and Sustainable Development In The Zone of Influence	Assessment of development compliance with policy
<p>Cork County Development Plan 2014</p>	<p><i>The County Council have a number of objectives relating to the protection, conservation and restoration of natural heritage sites including specific objectives relating to the Natura 2000 network.</i></p> <p><i>It is an objective of the plan to protect European sites that form part of the Natura 2000 network and for proposed developments to pose no loss of protected habitats and species during the lifetime of the Plan. The no./percentage of developments in/near Natura 2000 network is to be monitored and recorded kept on the percentage of qualifying interest features which have achieved their specific objectives of maintenance or restoration.</i></p> <p><i>It is the policy of the Council to facilitate new development with no compromise in the favourable conservation condition of European sites. No compromise or impact on the achievement of the favourable conservation condition objectives (whether maintain or restore) of European sites. Designation of additional areas due to biodiversity and/or geological value. Percentage of unique habitats and species lost in designated sites through trending of annual surveys.</i></p> <p><u>Natural Heritage and Biodiversity Policies and Objectives</u></p> <p><i>County Development Plan Objective HE 2-1:</i></p> <p><i>Site designated for Nature Conservation provide protection to all natural heritage sites designated or proposed for designation under National and European legislation and International Agreements, and to maintain or develop linkages between these. This includes Special Areas of Conservation, Special Protection Areas, Natural Heritage Areas, Statutory Nature Reserves, Refuges for Fauna and Ramsar Sites.</i></p> <p><i>County Development Plan Objective HE 2-2:</i></p> <p><i>Protected Plant and Animal Species Provide protection to species listed in the Flora Protection Order 1990, on Annexes of the Habitats and Birds Directives, and to animal species protected under the Wildlife Acts in accordance with relevant legal requirements.</i></p> <p><i>County Development Plan Objective HE 2-3:</i></p>	<p>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 is located outside of any Nationally designated sites, as described in Section 7.5.1.1. No potential for negative cumulative impacts when considered in conjunction with the current proposal were identified. No developments or projects identified within the Development Plan were found to occur in the wider area surrounding the Proposed Development.</p>

Plans	Key Policies/Issues/Objectives Directly Related To European Sites, Biodiversity and Sustainable Development In The Zone of Influence	Assessment of development compliance with policy
	<p><i>Biodiversity outside Protected Areas retain areas of local biodiversity value, ecological corridors and habitats that are features of the County’s ecological network, and to protect these from inappropriate development. This includes rivers, lakes, streams and ponds, peatland and other wetland habitats, woodlands, hedgerows, tree lines, veteran trees, natural and semi-natural grasslands as well as coastal and marine habitats. It particularly includes habitats of special conservation significance in Cork as listed in Volume 2 Chapter 3 Nature Conservation Areas of the plan.</i></p> <p>County Development Plan Objective HE 2-4: Protection of Wetlands</p> <p><i>Ensure that an appropriate level of assessment is completed in relation to wetland habitats subject to proposals which would involve drainage or reclamation. This includes lakes and ponds, watercourses, springs and swamps, marshes, heath, peatlands, some woodlands as well as some coastal and marine habitats.</i></p>	

Plans	Key Policies/Issues/Objectives Directly Related To European Sites, Biodiversity and Sustainable Development In The Zone of Influence	Assessment of development compliance with policy
<p>National Biodiversity Action Plan 2017-2021</p>	<p><i>Target 6.2 - Sufficiency, coherence, connectivity and resilience of the protected areas network substantially enhanced by 2020.</i></p>	<p>There will be no adverse effects 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>

Plans	Key Policies/Issues/Objectives Directly Related To European Sites, Biodiversity and Sustainable Development In The Zone of Influence	Assessment of development compliance with policy
<p>The Regional Planning Guidelines for the South East 2010-2022</p>	<p>PPO 8.6 Planning Authorities should provide for the following biodiversity objectives through County and City Development Plans and Local Area Plans:</p> <ul style="list-style-type: none"> - <i>Protect natural heritage sites designated or proposed for designation in National and European legislation, and in other relevant International Conventions, Agreements and Processes (e.g. Ramsar sites, Special Protection Areas, Special Areas of Conservation, Natural Heritage Areas, statutory nature reserves).</i> - <i>Ensure that development does not have a significant adverse impact, incapable of satisfactory mitigation, on plant, animal and bird species and habitats protected by law and that developments affecting Natura 2000 sites are assessed in compliance with Article 6 of the Habitats Directive.</i> - <i>Encourage and promote sustainable access where appropriate to natural heritage, geological and geomorphological systems, sites and features.</i> - <i>Implement the actions as set out in the National Biodiversity Plan and Ireland’s Strategy for Plant Conservation.</i> - <i>Maintenance and restoration of water quality in areas listed on the Register of Protected Areas under the Water Framework Directive including Freshwater Pearl Mussel Catchments.</i> - <i>Protection of Fisheries and Shellfisheries.</i> - <i>Support the application of Habitat Mapping in the region and integrate this information into land use policies and planning.</i> - <i>Identify and protect sites of local biodiversity interest that act as ecological corridors linking sites of conservation importance.</i> - <i>Adopt and implement Biodiversity Action Plans at local level.</i> 	<p>The guidance document was comprehensively reviewed, with particular reference to policies and objectives that relate to 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 is located outside of any Nationally designated sites, as described in Section 7.5.1.1. No potential for negative cumulative impacts when considered in conjunction with the current proposal were identified. No developments or projects identified within the Development Plan were found to occur in the wider area surrounding the Proposed Development.</p>

Plans	Key Policies/Issues/Objectives Directly Related To European Sites, Biodiversity and Sustainable Development In The Zone of Influence	Assessment of development compliance with policy
	<p>- <i>Initiate local campaigns for biodiversity promotion such as native tree planting schemes, creation of wildlife corridors and wetlands creation across the region.</i></p> <p>- <i>Protect geological sites of national and international interest.</i></p> <p><i>PPO 8.7 It is an objective of the Regional Authority to encourage and support a co-ordinated approach for protection and enhancement of the region’s flood plains, wetlands and watercourses for their biodiversity and flood protection values.</i></p>	

7.7.2 Assessment of Projects

As described in Section 2.2 of the EIAR, relevant projects have been assessed in-combination with the Proposed Development and include planning applications in the vicinity of the site, within the zone of influence of all habitats and species considered in this report, and include other wind energy applications within the wider area. These have not been repeated here to reduce the duplication of information within this EIAR. However, they have been fully considered in the assessment. In addition, Section 7.7.4 (below) concludes on their potential for impact on biodiversity.

Other smaller developments within the wider study area, as fully described in Section 2.4.1 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.

For the purposes of this cumulative assessment, wind farms within a 10-kilometre radius of the Proposed Development area (Refer to Chapter 2, Figure 2-2) were considered. Wind farms occurring at greater distances were considered, however, given the nature of the KERs identified within the EIAR study area and that no significant residual effects were identified, further detailed analysis is not required.

7.7.3 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 in forestry habitats, which generally provide low value habitats for faunal species and some peatland habitats of County importance. The loss of peatland habitat 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.

7.7.4 Assessment of Cumulative Effects

The residual construction, operational and decommissioning impacts of the Proposed Development were considered cumulatively with other plans and projects. 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 7.6, 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. The Proposed Development also includes mitigation and offsetting measures, as fully described in Section 7.6. The incorporation of these measures into the proposed development will further minimise / offset any 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.

7.8 Conclusion

Following consideration of the residual effects (post mitigation) it is concluded that the Proposed Development will not result in any significant effects on any of the identified KERs. No significant effects on receptors of International, National or County Importance were identified.

The potential for effects on the European Designated Sites are fully described in the Natura Impact Statement that accompanies this application. The NIS concludes that in view of best scientific knowledge and on the basis of objective information, the Proposed Development either individually or in combination with other plans or projects, is not likely to have significant effects on the European Sites that were assessed as part of the Appropriate Assessment process. No Nationally designated sites were identified as KERs and no potential pathways for effect were identified.

Provided that the proposed development is constructed and operated in accordance with the project design and mitigation that is described within this application, significant individual or cumulative effects on ecology are not anticipated at the international, national or county scales or on any of the identified KERs.