Dunneill Wind Farm, Co. Sligo - EIAR

Dunneill Wind Farm, Co. Sligo

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NON-TECHNICAL SUMMARY

Introduction

This Environmental Impact Assessment Report (EIAR) has been prepared by McCarthy Keville O'Sullivan Ltd. (MKO) on behalf of Brickmount Ltd. who intend to apply to Sligo County Council (SCC) for planning permission to extend the operational life of the existing Dunneill Wind Farm and all associated infrastructure for a further period of 15 years in the three townlands of Crowagh or Dunneill Mountain, Tawnadremira, and Ballyglass.

The Proposed Development is located approximately 3.5 kilometres (km) south of the village of Dromore West and approximately 3.7 km southwest of the village of Templeboy in County Sligo. The approximate grid reference location for the centre of the site is ITM E544576 N829278.

This EIAR complies with the EIA Directive 2011/92/EU as amended by Directive 2014/52/EU. The Environmental Impact Assessment (EIA) of the proposed project will be undertaken by Sligo County Council, as the competent authority.

Applicant

The applicant for the Proposed Development, Brickmount Ltd., are a wholly owned subsidiary company of SSE Renewable (Ireland) Ltd. (SSE). SSE are committed to the development of renewable energy as part of the transition to a low-carbon future, including onshore wind. They currently own, operate and maintain 19 wind farms in the Republic of Ireland, and co-own Ireland's largest wind farm, Galway Wind Park, cumulatively producing 700MW of power. SSE Renewables have a proven track record of delivering wind energy products in Ireland for over 20 years.

Brief Description of the Proposed Development

Brickmount Ltd (the Applicant) is seeking planning permission to extend the operational lifetime of the existing Dunneill Wind Farm, a 13-turbine wind energy development on a 66 hectare (ha) site at Dunneill, approximately 3.5 kilometres (km) south of the village of Dromore West and approximately 3.7 km southwest of the village of Templeboy in County Sligo. The Proposed Development is located within the townlands of Crowagh (or Dunneill Mountain), Tawnadremira,and Ballyglass. The application seeks a fifteen (15) year planning permission for continuation of the operational life of the existing wind farm (SCC Reg. Ref. 03/619 & ABP Pl. Ref. 21.204790, as amended by SCC Reg. Ref 10/371 and 10/388) from the date of expiration (March 2024) of the current permissions. No modifications are proposed to the existing windfarm which comprises the following elements:

a) *13 no. existing Vestas V52 850 kilowatt (kW) wind turbines with a maximum overall blade tip height of 75 metres (m).*
b) *Existing 1 no. onsite 20 kilovolt (kV) electrical substation compound which includes a control building, welfare facilities, associated electrical plant and equipment, security fencing, associated underground cabling and a foul waste holding tank.*
c) *Existing 1 no. permanent meteorological mast with a height of 50m and an associated concrete platform/base;*
d) *All associated existing underground electrical and communications cabling connecting the turbines to the on-site substation;*
e) *Existing site access tracks of circa 3.3 kilometres (km) total length, 3 no. car parking spaces and 13 no. turbine hardstands;*
f) *2 No. existing gated site entrances from an unnamed third-class public road which dissects the windfarm site into north and south;*
g) *Existing Site drainage; and,*

h) *All existing ancillary infrastructure, associated site fencing and signage.*

The Dunneill Wind Farm is connected to the National Grid via an existing medium voltage 20 kilovolt (kV) underground cable which runs east from Dunneill to Kingsmountain Wind Farm, and subsequently on to Cunghill 110 kV substation, located approximately 20 kilometres (km) southeast of the Dunneill wind farm. The grid connection is assessed as a cumulative project within this EIAR, as it was considered exempted development at the time of construction and was not subject to planning permission and therefore does not form part of the Proposed Development.

Brickmount Ltd. have demonstrated that the existing turbine technology (Vestas V52 850kW) on the site is capable of continuing to operate efficiently for a further 15 years without a significant loss in the total current generating capacity of c.11 MW.

When originally designed, the layout of the Dunneill Wind Farm was constraints-led, thereby avoiding environmentally sensitive parts of the site. No change or upgrade to the existing site roads or layout is proposed. The Proposed Development makes use of the existing on-site access roads and tracks, with approximately 1.2km of existing roadway within the wind farm site boundary. Site roads are constructed of consolidated gravel with a running width of approximately 5m.

There are eight no. residential properties located within 500m of a turbine. Of these eight properties, four are derelict properties, three are third party dwellings, and one is a participating landowner. The visual amenity setback distance to residential dwellings will achieve the proposed 4-times turbine tip-height of 300m in all cases.

Need for the Development

In November 2021, the Government announced a renewable electricity target of 80% by 2030 as part of the governments Climate Action Plan. The Proposed Development would likely be operational until 2039 and would therefore contribute to this 2030 target. More recently, the EPA reported that Ireland is set to fall far short of all of its carbon emissions reduction targets for 2030, despite climate action measures in the National Development Plan (EPA, June 2022). The proposed extension of operation of the Dunneill Wind Farm is key to helping Ireland address these challenges as well as addressing the country's over-dependence on imported fossil fuels.

In the recent Sustainable Energy Authority of Ireland (SEAI) report titled '*Energy Security in Ireland, 2020 Report*' (published September 2020), it was reported that renewable energy sources (which include wind) accounted for 32.5% of Ireland's gross electricity consumption in 2018, which was well over halfway to Ireland's 2020 target of 40%. EirGrid in their '*All Island Generation Capacity Statement 2020 - 2029*' (August 2020), states that new wind farms commissioned in Ireland in 2019 brought total wind capacity to over 4,127MW, contributing to the increase in overall RES-E percentage to 35.7% with wind energy accounting for 32%. This shows a positive increase in renewable energy in Ireland from that previous records, but still highlights the progress required to meet our current 2030 targets.

Sections 2.1 and 2.2 in Chapter 2 of this EIAR on Background to the Proposed Development, presents a full description of the international, national and regional national renewable energy policy context for the proposed project. Section 2.3 addresses climate change, including Ireland's current status with regard to meeting greenhouse gas emission reduction targets.

Economic Benefits

The Proposed Development will have several significant long-term and short-term benefits for the local economy including job creation, local authority commercial rate payments and a Community Benefit Scheme.

It is estimated that the proposed extension of operation will maintain approximately 2-3 part-time roles in the wind farm's operation and maintenance which will endure throughout the project's lifetime.

Additional employment will be created in the region through the supply of services and materials to the development. In addition, income will also be generated by local employment from the purchase of local services i.e., travel and lodgings.

Dunneill Wind Farm has contributed over €1 million in county council rates since 2010. The continued annual commercial rate payments from the Proposed Development to Sligo County Council, will be redirected to the provision of public services within Co. Sligo. These services include provisions such as road upkeep, fire services, environmental protection, street lighting, footpath maintenance etc. along with other community and cultural support initiatives.

Should the Proposed Development receive planning permission, there are substantial opportunities available for the local area in the form of Community Benefit Funds. Based on the current proposal, a Community Benefit Fund in the region of €300,000 will be made available over the lifetime of the project. The value of this fund is proportional to the level of installed capacity (megawatts) at the site and will support and facilitate projects and initiatives including youth, sport and community facilities, schools, educational and training initiatives, and wider amenity, heritage, and environmental projects. Further details on the proposed Community Benefit Fund are presented in Section 2.6.3 of Chapter 2 of this EIAR.

Purpose and Structure of this EIAR

The purpose of this EIAR is to document the current state of the environment in the vicinity of the Proposed Development and to quantify the likely significant effects of the Proposed Development on the environment. The EIAR submitted by the applicant provides the relevant environmental information to enable the Environmental Impact Assessment (EIA) to be carried out by the competent authority, in this case Sligo County Council.

The EIAR project team comprises a multidisciplinary team of experts with extensive experience in the assessment of wind energy developments and in their relevant area of expertise. Each chapter of this EIAR has been prepared by a competent expert in the subject matter. The chapters of this EIAR are as follows:

1. *Introduction*
2. *Background to the Proposed Development*
3. *Consideration of Reasonable Alternatives*
4. *Description of the Proposed Development*
5. *Population and Human Health (including Shadow Flicker)*
6. *Biodiversity (Flora and Fauna)*
7. *Ornithology (Birds)*
8. *Land, Soils and Geology*
9. *Water (Hydrology and Hydrogeology)*
10. *Air and Climate*
11. *Noise and Vibration*
12. *Archaeological, Architectural and Cultural Heritage*
13. *Landscape and Visual*
14. *Material Assets (including Traffic and Transport, Telecommunications and Aviation)*
15. *Interactions of the Foregoing*
16. *Schedule of Mitigation*

A Natura Impact Statement (NIS) has also been prepared in line with the requirements of the Habitats Directive and has been submitted to the Planning Authority as part of the planning application documentation.

Background to the Proposed Development

This section of the EIAR presents policy information on Energy and Climate Change policy and targets, the strategic, regional, and local planning context for the proposed development, scoping and consultation, and the cumulative impact assessment process.

Energy and Climate Change

The proposed development comprises of the continued use of the Dunneill Wind Farm. The site of the Proposed Development is currently an operational wind farm which has been supplying renewable energy to the national electricity grid since being commissioned in 2010. Planning permission is being sought from Sligo County Council (WCC) to enable the existing wind farm to continue operating in its current form (with maintenance and minor upgrades to the turbines and electrical components, if required) for an additional 15 years. The existing wind farm has been contributing to Ireland's energy and climate targets over the past 12 years. The primary driver behind the Proposed Development is continue to provide renewable energy to offset the use of fossil fuels within the electricity generating sector. Generation from wind power represents the most economical renewable option to reduce emissions within the power generation sector and is the most mature technology available to achieve national targets that have been established for decarbonisation. The need to decarbonise and reduce greenhouse gas emissions has always been imperative, however, in recent years the urgency involved has become clearer to all stakeholders. The Climate Action Plan published by the Government in 2021 has clearly identified the need for and urgency of change, and sets out a sectoral roadmap which aims to deliver a 51% reduction in greenhouse gases (GHG) emissions by 2030 and net-zero emissions by no later than 2050. It states:

> *"The Plan lists the actions needed to deliver on our climate targets and will be updated annually, including in 2022, to ensure alignment with our legally binding economy-wide carbon budgets and sectoral ceilings."*

The SEAI's *'Energy in Ireland 2020'* report provides the most up to date figures available in relation to energy production and consumption in Ireland. In terms of energy generation in 2019, the share of renewables in the generation fuel mix increased to 25.7%, compared with 22.3% in 2018 due, mainly, to increased wind generation. In 2019, electricity generated from renewable sources amounted to 11,780 GWh, accounting for 37.6% of gross electricity consumption (compared with 33% in 2018). Wind again accounted for the largest renewable energy generator, furthermore wind energy was the second largest source of electricity generated in 2019 after natural gas. It is clear based on the findings of SEAI's Energy in Ireland 2020 report the overall importance which wind energy has in meeting energy demands within Ireland.

Local Policy

Sligo County Development Plan 2017-2023

The Sligo County Development Plan 2017-2023 SCDP) sets out Sligo County Council's intentions for the future development of land, including measures for the improvement of the natural and physical environment and the provision of infrastructure. The Plan presents the Council's outlook for the future development of County Sligo and its Gateway City for the period up to 2023 within a long-term perspective.

There is currently no Wind Energy Strategy in place for County Sligo which identifies strategic areas in the county where wind energy developments are generally acceptable, open for consideration or not normally permissible, under objective SO-EN-2 of the SCDP, it is an objective to:

> *"Undertake an analysis of suitable areas for wind energy and prepare a map showing County Sligo's Landscape Suitability for Wind Energy Developments, in accordance with Section 3.5 of the Wind Energy Guidelines (2006) and any subsequent revisions",*

However, this has not been undertaken to date.

Section 10.6 of the SCDP sets out the councils' consideration regarding climate change in the context of the County. In this regard, it is clear that the SCDP promotes the development and use of renewable sources of energy. The following is noted:

> *"The burning of fossil fuels for energy has contributed significantly to the build-up of greenhouse gases (GHGs) and the resulting increase in global warming. Energy efficiency and the use of renewable energy help to reduce GHG emissions and therefore play a key role in tackling climate change. Climate and energy issues already have national, regional and cross-border momentum and need to become urgent priorities at local level"*

Under this section the following relevant objectives are included:

- Support for renewable energy production to facilitate the transition to a low-carbon energy system,
- Support for the "green economy" to develop indigenous enterprises, create local employment and secure sustainable economic growth,
- Sustainable and climate-resilient building design, construction and retrofit for higher energy efficiency and enhanced climate adaptation

The following relevant policies are also identified under Section 10 of the SCDP:

- **P-CAM-1** Support the implementation of the National Climate Change Adaptation Framework 2012, by including relevant measures in any forthcoming adaptation plans. Such plans shall be in accordance with national guidance issued by the DoECLG and EPA and undertaken in collaboration with the Northern and Western Regional Assembly, Mayo County Council, Roscommon County Council, Leitrim County Council and Donegal County Council.
- **P-CAM-2** - Prepare a climate change adaptation strategy for County Sligo in compliance with national guidance and in consultation with all relevant stakeholders.
- **P-CAM-3** - Raise public awareness and build local resilience in relation to climate adaptation.
- **P-CAM-4** - Facilitate and assist County Sligo's transition to a low-carbon economy and society.
- **P-CAM-5** - Promote, support and implement measures that reduce man-made GHGs, including energy management, energy efficiency, compact development patterns, low-carbon buildings and sustainable transport.
- **P-CAM-7** - Promote and support the research and development of local renewable energy sources.
- **P-CAM-8** - Promote and support the use of renewable energy in all sectors.
- **P-CAM-9** - Support community participation in, and benefit from, renewable energy and energy efficiency projects.
- **P-CAM-10** Support local innovation, economic activity and job creation in the "green" economy by encouraging investment in products, services and technologies needed in a low carbon future.

Section 11.1 of the SCDP recognizes member States of the EU are required to significantly increase their use of renewable energies and to improve energy efficiency in all sectors, it is further noted that County Sligo is rich in renewable energy resources and *"is well-placed to lay solid foundations for a sustainable energy future. Harnessing this potential will boost a range of sectors, while enhancing energy self-sufficiency. The rewards include inward investment, job creation, business development, rural regeneration and a reduction of fuel poverty."*

Section 11.1.2 calls out the fact that *"Sligo's mountainous landscape and exposed location on the western seaboard combine to create good conditions for the generation of wind power. According to the Irish Wind Energy Association (IWEA), the wind farm capacity available in the County in 2016 was 49.15 MW, produced by five wind farms located at Kings Mountain, Dunneill, Carran Hill, Geevagh* *and Lackan".* It is noted that pressure for future wind farm development is likely to be concentrated in upland and coastal areas, particularly where energy providers can access the national electricity grid, the siting of wind turbines requires careful consideration. It is a challenge for the Council to achieve a reasonable balance between: (a) responding to government policy on renewable energy; and (b) enabling the wind energy resources of the County to be harnessed in an environmentally sustainable manner. The following relevant policies are listed:

- **SP-EN-1** Support the sustainable development, upgrading and maintenance of energy generation, transmission, storage and distribution infrastructure, to ensure the security of energy supply and provide for future needs, as well as protection of the landscape, natural, archaeological and built heritage, and residential amenity and subject to compliance with the Habitats Directive.
- **SP-EN-2** Facilitate the sustainable production of energy from renewable sources, energy conversion and capture in forms such as wind power, hydro-power, wave generated energy, bioenergy, solar technology and the development of Waste to Energy/Combined Heat and Power schemes at appropriate locations and subject to compliance with the Habitats Directive. All such development proposals will be assessed for their potential impact on urban and rural communities, Natura 2000 sites, designated Sensitive Rural Landscapes, Visually Vulnerable Areas, Scenic Routes and scenic views, as well as in accordance with strict location, siting and design criteria.
- **SP-EN-6** Support the implementation of relevant programmes arising from the Government's Energy White Paper 'Ireland's Transition to a Low Carbon Energy Future 2015-2030 (or any successor document).

Planning History

The relevant planning history of the proposed development site, the planning applications in the vicinity of the site along with other wind energy applications within the wider area are provided under Section 2.3 within this EIAR.

Scoping and Consultation

A comprehensive scoping and consultation exercise was undertaken during the preparation of this EIAR. A scoping report, providing details of the application site and the Proposed Development, was prepared by McCarthy Keville O'Sullivan Ltd. (MKO) and circulated in June 2021. MKO requested the comments of the relevant personnel/bodies in their respective capacities as consultees with regards to the scope and preparation of the EIAR.

MKO, on behalf of the applicant Brickmount Ltd. a division of SSE Renewables (Ireland) Ltd. issued a pre-planning request to Sligo County Council on the 13th of July 2021, in respect of the proposed extension of operation to the existing Dunneill Wind Farm. Sligo County Council Planning Department responded on the 30th of July 2021 stating that they do not feel the need for a formal pre-planning meeting and are satisfied with the consultation that had taken place with SSE in January and February 2021 and scoping letter sent in June 2021. In their response to the Scoping Letter received on the 22nd of June 2021, as outlined in Table 2-3 above, Sligo County Council stated that they are satisfied that MKO team has the required level of expertise to act as Environmental Consultants with the responsibility to prepare the EIAR and carry out AA in relation to the Proposed Development. Sligo County Council had no other comments or suggestions.

Consideration of Reasonable Alternatives

This chapter of the EIAR contains a description of the reasonable alternatives that were studied by the developer, which are relevant to the proposed project and its specific characteristics and provides an indication of the main reasons for the option chosen, taking into account the environmental effects. The consideration of alternatives includes alternative design, technology, layout, size and scale. A 'Do-Nothing Scenario' i.e., an outline of what is likely to happen to the environment should the Proposed Development not be implemented, is also included.

The initial design of the existing Dunneill Wind Farm, prior to its construction and commencement of operations in 2010, was an informed and collaborative process, involving designers, developers, engineers, environmental, hydrological and geotechnical, archaeological specialists and traffic consultants. This proposal for the extension of operation of the wind farm was informed by site-specific information and experience gained during the 14-year operational history.

The proposed extension of operation of the wind farm does not include for any significant alterations to the existing site design or layout. The aim of the current multidisciplinary Project Team in extending the lifespan of the wind farm is to continue from the past successful operation of the wind farm, whilst ensuring any new processes or methods to reduce the potential for environmental effects are incorporated into the future operation.

It is considered appropriate to extend the operational phase of the existing wind energy development at the current site for a number of reasons including the successful operational history at its current location since 2010. The site has proven to have reliably good wind speeds and maintained a good generating capacity. In addition, the existing wind turbine models can continue to operate efficiently for a further 15 years without a significant loss in the total generating capacity of c.11 megawatts (MW).

The existing wind farm infrastructure on the site, including the substation, site roads and met mast, can continue to be used for the extended operational period, which reduces environmental effects when compared to an undeveloped greenfield site, particularly in relation to landscape and visual effects and effects on locally important habitats. The existing wind farm site entrance can continue to be used without any significant alterations or road works required.

Brickmount Ltd. has collected a significant amount of site-specific data relating to the characteristics of the site and the local area, and this information was used during the development's operational review process, in particular in considering the feasibility of alternative renewable technologies, such as solar energy.

The Development can contribute to the achievement of national energy targets and can continue to provide significant social and economic benefits for the local area (direct and indirect employment, community development fund, recreational amenity) and the wider region.

Having been previously permitted by An Bord Pleanála and the Sligo County Council, the principle for wind energy development at this site is already well established and has been proven to be in accordance with the proper planning and sustainable development of the area.

It is noted that of the total current wind farm development lands (i.e., EIAR Study Area = approximately 66 hectares [ha]), the development footprint accounts for approximately 2.8 ha, or 4.2% of the total area. The remainder of the site is currently either used for commercial forestry and rough grazing. The existing commercial and agricultural uses can, and will, continue in conjunction with this proposed use of the development site.

Description of the Proposed Development

The overall layout of the Proposed Development is shown on Figure 4-1. This drawing shows the locations of the wind turbines, electricity substation, internal roads layout and the main site entrance. Detailed site layout drawings of the Proposed Development are included in Appendix 4-1 to this EIAR.

The Proposed Development is limited to an extension of the operational life of the existing wind farm. As such there are no changes proposed to the existing development components. The various elements of the existing wind farm will remain in their current condition and will be subject to ongoing routine maintenance.

The existing wind turbines have a tip-height of 75m, a hub height of 49m, rotor diameter of 52m, and a ground to lowest blade swept path of 23m. The wind turbines that are installed on the site are conventional three-blade turbines, that are geared to ensure the rotors of all turbines rotate in the same direction at all times. The existing wind turbines at the Dunneill Wind Farm were manufactured by the leading Danish turbine manufacturer, Vestas, with each turbine capable of producing 850kW of electricity, resulting in an installed capacity of c.11 MW.

Each wind turbine is secured to a reinforced concrete foundation that has been installed below the finished ground level. The turbine foundation transmits any load on the wind turbine into the ground. The existing turbine foundations are square in plan with each side measuring 11.5 metres in length, and with founding levels from 1.9 metres below ground level.

Hard standing areas consisting of levelled and compacted hardcore are in place around each turbine base to facilitate access and maintenance and generally provide a safe, level working area around each turbine position. The hard-standing area is intended to accommodate a crane if necessary during maintenance works. There will be no changes to the existing hardstanding areas required as part of the Proposed Development. Turbine hard stand areas vary at each of the 13 turbines, with an average of approximately 875m^2.

No changes are proposed to the existing site access roads and tracks of approximately 3.3 kilometres (km) total length which provide vehicular access to all turbines from the main entrance gate at the north of the site. Site roads are constructed of consolidated gravel with a running width of 5m. Access to the wind farm site is via two existing entrances from the third-class/local road that bisects the site. One site entrance turns south towards the southern part of the wind farm (T9 – T13), and a second entrance turns north from the local road towards the northern area of the wind farm (T1 – T8). Both site entrances, either side of the local road are used for day-to-day maintenance and monitoring of the wind farm and substation. No changes to these site entrances are proposed.

The existing 20kV electricity substation is located to the south-west of the site. The existing substation and electrical components were constructed by and will be maintained to Brickmount Ltd. specifications. The footprint of the existing on-site electricity substation compound measures approximately 455 square metres. The substation compound includes a wind farm control building and the electrical components (e.g. transformers) necessary to consolidate the electrical energy generated by each wind turbine, and export that electricity from the wind farm substation to the National Grid.

Each turbine is connected to the on-site electricity substation via underground 20kV electricity cables. 120mm aluminium communication cables also connect each wind turbine to the wind farm control building in the on-site substation compound. The electricity and communication cables running from the turbines to the on-site substation compound run in cable trenches approximately 1.1 metres below ground level, typically along the side of roadways and through cable ducts at road crossings. The route of the cable follows the access track to each turbine location.

One existing permanent metrological mast is included as part of the Proposed Development, located within the northern part of the site, south of Turbine 6. The metrological mast is equipped with wind monitoring equipment at various heights. The mast is a self-supporting slender structure of 50m in height.

The topography across the site slopes downwards generally northwards towards the coastline with a maximum elevation of approximately 190 metres Ordnance Datum (m OD) in the south of the site, between turbine T12 and T13, and a minimum elevation of approximately 110 metres Ordnance Datum (m OD) in the south of the site at T2. The Dunneill River runs directly adjacent to and west of the existing wind farm, in a south-north direction towards Sligo Bay. Dunneill River is located approximately 15m west of the nearest wind farm infrastructure, running parallel to the access track between Turbine No. 7 and Turbine No. 6. Three existing shallow surface streams and drainage crossings were also recorded within the wind farm site. There are no ground disturbing works proposed as part of the Proposed Development. Therefore, no existing natural drainage features will be altered as part of the Proposed Development and there will be no direct or indirect discharges to natural watercourses. The Proposed Development will not result in any changes to the existing drainage within the project site.

Each turbine will be subject to a routine maintenance programme involving a number of checks and changing of consumables, including oil changes. In addition, there will be a requirement for unscheduled maintenance, which could vary between resetting alarms to major component changes requiring a crane. The electricity substation and site tracks will also require periodic maintenance. The wind farm manager will continue to attend the site regularly to perform inspections and oversee maintenance works.

Brickmount Ltd. have determined that the existing wind turbines at the Dunneill Wind Farm have a remaining lifespan of at least 15 years. Following the end of their useful life, the wind turbines may be replaced with a new set of turbines, subject to planning permission being obtained, or the Proposed Development will be decommissioned fully.

Population and Human Health

One of the principal concerns in the development process is that people, as individuals or communities, should experience no diminution in their quality of life from the direct or indirect impacts arising from the construction and operation of a development. The key issues examined in this section of the EIAR relate to population and human health and incorporate population statistics, employment and economic activity, land-use, residential amenity (shadow flicker, noise, visuals and telecommunications), community facilities and services, tourism, property values, accidents/natural disasters, health and safety and other environmental hazards such as water contamination, air pollution, traffic and flooding.

Information regarding human beings, population, and employment and general socio-economic data were sourced from the Central Statistics Office (CSO), the Sligo County Development Plan 2017 – 2023, Fáilte Ireland and any other literature pertinent to the area. The study includes an examination of the population and employment characteristics of the area. This information was sourced from the results of the Censuses of Ireland 2011 and 2016 which are available on the CSO website, www.cso.ie. Census information is divided into State, Provincial, County, Major Town and District Electoral Division (DED) level but may not be available for all levels.

In order to assess the population in the vicinity of the Proposed Development, a Population Study Area was defined in terms of 4 no. DEDs; Templeboy South / Mullagheruse DED and (partially) Dromore DED. The Study Area has a population of 680 persons, as of 2016 and comprises a total land area of 96 km^2.

The primary settlements (population centres) within the Study Area include Ballysadare, Sligo Town and Ballina, and offer main services and local amenities. The majority of amenities and community facilities, including GAA and other sports clubs, youth clubs and recreational areas available in the area are located in the centres of settlements throughout the wider area. There are currently no key identified public tourist attractions pertaining specifically to the site of the Proposed Development.

The predominant surrounding land use within the Population study area is agricultural, indicating a predominant use for pasture. The southern portion of the site is located within a conifer plantation, with the northern portion of the site predominantly used as agricultural grassland, with small pockets of forest.

The population of the Study Area reduced in the period between the 2011 Census and the 2016 Census by 2.6% from 698 to 680 people. The rate of population growth declined in this period. The highest level of employment within the Study Area was recorded in the Farmer category. The levels of employment within the Employer/Manager, Higher Professional, Lower Professional and Non-Manual categories in the Study Area were much lower than those recorded for the State and County Sligo, while those recorded within the Skilled Manual, Own Account and Farmer categories were higher. The Semi-Skilled worker category was largely the same as that recorded at a State and County level.

There is currently no published credible scientific evidence to positively link wind turbines with adverse health effects. The main publications supporting the view that there is no evidence of any direct link between wind turbines and health are summarised in Chapter 5 of this EIAR. Although there have been no empirical studies carried out in Ireland on the effects of wind farms on property prices, it is a reasonable assumption based on the available international literature that the provision of a wind farm at the proposed location would not impact on the property values in the area.

Shadow flicker is an effect that occurs when rotating wind turbine blades cast shadows over a window in a nearby property. Shadow flicker is an indoor phenomenon, which may be experienced by an occupant sitting in an enclosed room when sunlight reaching the window is momentarily interrupted by a shadow of a wind turbine's blade. Shadow flicker effect lasts only for a short period of time and happens only in certain specific combined circumstances. Current guidelines recommend that shadow flicker at neighbouring dwellings within 520 metres (ten times the rotor diameter) of a proposed turbine location should not exceed a total of 30 hours per year, or 30 minutes per day.

The study area for the shadow flicker assessment is ten times rotor diameter from each turbine as set out in the *Wind Energy Development Guidelines for Planning Authorities* (Department of Environment, Heritage and Local Government, 2006). All residential properties located within ten rotor diameters, i.e., 520 metres, have been included in the assessment. There is a total of 9 No. residential dwellings located within 520 metres of the existing turbine locations. There is only one third-party property located within 4 times the turbine tip height (300m), at 297m from the closest turbine T5.

The WindFarm computer software was used to model the predicted daily and annual shadow flicker levels in significant detail, identifying the predicted daily start and end times, maximum daily duration and the individual turbines predicted to give rise to shadow flicker.

Of the 9 No. dwellings modelled, three properties are third-party inhabitable dwellings, one is a participating property/landowner and the remaining five are derelict properties. The derelict properties will not require mitigation measures. The three third-party dwellings located within the study area have predicted shadow flicker occurrences, which will be mitigated against. It is worth noting that the predicted shadow flicker is considered conservative and in reality, the occurrence and/or duration of shadow flicker at these properties is likely to be eliminated or significantly reduced due to assumption of worst-case scenario conditions.

With the implementation of mitigation measures proposed, there will be no significant effects related to shadow flicker from the continued operation of the wind farm.

The provision of 20 kilovolt (kV) underground electric cables required at the Proposed Development to connect the turbines to the substation is common practice throughout the country and installation to the required specification does not give rise to any specific health concerns. The extremely low frequency

(ELF) and electric and magnetic fields (EMF) associated with the operation of the proposed cables fully comply with the international guidelines for ELF-EMF set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP), a formal advisory agency to the World Health Organisation, as well as the EU guidelines for human exposure to EMF.

A wind farm is not a recognised source of pollution. Should a major accident or natural disaster occur the potential sources of pollution on-site during the operational phase is limited. Sources of pollution with the potential to cause significant environmental pollution and associated negative effects on health such as bulk storage of hydrocarbons or chemicals, storage of waste materials etc. are limited.

Impacts on human beings during the operational phase of the Proposed Development are described in Chapter 5 in terms of health and safety, employment and investment, population, landuse, noise, dust, traffic, tourism, residential amenity, renewable energy production and reduction in greenhouse gas emissions, and interference with communication systems. Where a negative impact was identified, the appropriate mitigation measures will be put in place to ensure that there will be no adverse impacts on human health in the surrounding area.

Following consideration of the residual effects (post-mitigation), the Proposed Development will not result in any significant effects on population and human health. Provided that the Proposed Development is operated in accordance with current best practice, and mitigation measures that are described within this application are implemented, significant effects on population and human health are not anticipated at local, county, national or international scale.

Biodiversity

The Biodiversity, Flora and Fauna Chapter of the EIAR was prepared by MKO and assesses the potential impacts on habitats, bats and other mammals. The habitats, flora and fauna of the site including species and habitats protected under the Habitats Directive (92/43/EEC) were assessed by means of a desk study of literature pertinent to the site and surrounding area, and field surveys including a survey of habitats and flora and walkover faunal surveys along with general observation work.

The key objectives of the Biodiversity assessment are to (i) Undertake a review of desktop and field survey information to inform an assessment of the current baseline ecological characteristics of the operational wind farm in relation to biodiversity, (ii)Evaluate the ecological significance of the proposals to extend the operational life of the wind farm in the context of biodiversity; and (iii)Assess the potential for direct, indirect and cumulative impacts of the proposals in the context of biodiversity.

Habitat, bat and other mammal surveys were undertaken between April 2021 to April 2022, to inform the current biodiversity baseline for the operational wind farm. Habitats within the site were classified based on vegetation present and management history. During the multi-disciplinary ecological walkover surveys, the potential for the study area to support protected birds, mammals, amphibians and additional fauna was assessed.

Habitat types identified as Key Ecological Receptors (KERs) on the site of the Proposed Development include *Eroding/upland rivers (FW1), Drainage Ditches (FW4), Dry heath (HH1), Wet health (HH3),* and *Upland blanket bog (PB2).* These habitats were classified as Local Importance (higher value) and identified as particularly sensitive to changes in water quality. As no new works are proposed as part of the extension of operation of the existing wind farm, and best practice methods in combination with mitigation measures will be in place to protect water quality, the potential for impacts to the habitat Key Ecological Receptors was not significant.

A small section of the Ox Mountains Bog SAC is located within the existing wind farm site boundary, and therefore presents the potential for hydrological connectivity. Following a highly precautionary approach, a potential pathway for indirect effects on the SAC during the operational phase (including routine maintenance works) and decommissioning phase was identified. Potential impacts in the form of surface water deterioration will be prevented by adherence to the mitigation described in Chapter 9 of the EIAR.

Effects upon European Sites are discussed within the Natura Impact Statement (NIS) which accompanies this report. The NIS concluded that the Proposed Development, by itself or in combination with other plans and projects, in light of best scientific knowledge in the field, did not adversely affect the integrity of any European sites.

Protected species such as the Geyer's whorl snail, Otter, and bats were considered in the valuation of the site for Local Importance (higher value). No invasive species were recorded in the proximity of any of the turbine sites.

Provided that the proposed development is operated in accordance with the best practice and mitigation that is described within this application, significant individual or cumulative effects on biodiversity are not anticipated at the international, national or county scales.

Ornithology

This chapter assesses the likely significant effects that the Proposed Development may have on bird species. Firstly, a brief description of the Proposed Development and the relevant legislation, guidance and policy is provided. This is followed by a comprehensive description of the assessment approach and methodology that was followed to obtain the information necessary to complete a thorough assessment of the potential effects of the Proposed Development on bird species. The baseline conditions at the study area are then described, including the results of the desk study and field surveys. All field survey effort and data is presented in full in Appendices 7-1 to 7-5 that accompany this application. An analysis of the results is then provided, which identifies Key Ornithological Receptor species and discusses their ecological significance. This section evaluates potential effects on these species in terms of the extended operational life and decommissioning phases of the Proposed Development. Taking a precautionary approach, an accurate prediction of the effects is derived following a thorough understanding of the nature of the Proposed Development along with a comprehensive knowledge of bird activity within the study area. The next sections of the chapter provide details on mitigation and best practice measures to be employed during each phase of the Proposed Development and a proposed Bird Monitoring Programme. Full details of the Bird Monitoring Programme are available in Appendix 7-6. The remaining sections of the chapter describe any residual effects following the proposed mitigation and best practice measures, and assess the potential for cumulative effects of the Proposed Development in combination with other plans and projects.

The potential for effects on sites designated for birds is fully described in the Natura Impact Statement (NIS) that accompanies this application. The NIS concluded 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 extended operational life and decommissioning of the Proposed Development will not adversely affect the integrity of any European sites.

Based on this assessment, it is considered that the potential effects of the Proposed Development upon birds will not be significant. Effects associated with habitat loss, disturbance displacement, collision risk and cumulative effects have been assessed to be no greater than ***Low*** (Percival, 2003) or ***Slight*** (EPA, 2022). In conclusion, no significant effects as a result of the Proposed Development are foreseen for Key Ornithological Receptors of the study area.

Land, Soils and Geology

This chapter assesses the likely significant effects that the Proposed Development may have on land, soils and geology and sets out the mitigation measures proposed to avoid, reduce or offset any potential significant effects that are identified.

A desk study of the Proposed Development site and the surrounding study area was completed in August 2021. The desk study involved an assessment of all the relevant geological data for the wind farm site and study area. In addition, a visual walkover survey of the site was undertaken in October 2021. The site was visually inspected for any surface indications of residual impacts to land, soils, and geology resulting from the historic construction and operation of the wind farm. Particular attention was paid to identifying any potential areas of soil erosion that might be the result of incorrect backfilling of excavations, or that may have arisen from operation of machinery and vehicles on the site.

There are no known areas of soil or ground contamination on the site. During the site walkover, no areas of particular contamination concern were identified. No evidence of any residual impacts to land, soils, and geology were observed.

There is one recorded Geological Heritage site within the wider area surrounding Dunneill Wind Farm. The Easky River solifluction lobe (SO005) is located approximately 7km southwest of the EIAR Study Area.

The soils on the site of the Proposed Development consist primarily of blanket peats and poorly drained mineral soils, with a small band of alluvially derived mineral sediment along the Dunneill River. The geology of the site consists fine limestones and calcareous shale, underlain by the Glencar Limestone Formation.

As no new construction or groundworks are proposed as part of the extended operation of the wind farm, there is limited potential for impacts to the subsurface soils and geology. During the operational phase, works are likely to include minor upgrades or replacements of turbine components, and mechanical/electrical components related to the substation. There is potential for limited use of plant and machinery as part of this maintenance work.

With implementation of the outlined mitigation measures No significant direct effects on land, soils and geology are likely associated with the proposed extension of operation of the wind farm, and no significant cumulative effects were identified in combination with other infrastructure projects in the surrounding area.

Hydrology and Hydrogeology

The water environment (hydrology and hydrogeology) aspects of the site have been characterised using available desk study information and a site walkover completed in October 2021.

The topography across the site slopes downwards in a northerly direction towards the coastline with a maximum elevation of approximately 190 metres Ordnance Datum (m OD) in the south of the site, between turbines T12 and T13, and a minimum elevation of approximately 110 metres Ordnance Datum (m OD) in the south of the site at T2. The entire site of the Proposed Development lies within the Western River Basin District (RBD). With respect to regional hydrology, under the Water Framework Directive (WFD) the proposed Development is located entirely within the Sligo Bay (35) surface water catchment. The Proposed Development site is located within 1 no. regional surface water sub-catchment, the Dunmoran_SC_010 sub-catchment.

The nearest named watercourse to the Proposed Development is the Dunneill River System, a river which has its origins in the Ox Mountains and flows northwards into Sligo Bay 13.5 km north of Templeboy village. The Dunneill River is located approximately 74 meters from the nearest turbine

(T13) at its closest point. A tributary of the Dunneill River, the Finandoo stream, bisects the development in an east-west direction, with the access road to the southern section of Dunneill Wind Farm crossing this stream. Additionally, there are three existing shallow surface streams and drainage crossings within the wind farm site. One of these streams is located to the north of the wind farm and runs in a south-north direction towards Doonbeakin river to the north of the wind farm, ultimately draining into Sligo Bay. The other two watercourses are located to the south of the site, both running in an east-west direction, draining to the Dunneill River.

Surface water runoff on the Proposed Development site typically drains in a west-northwest direction towards the Dunneill River. There are a number of manmade drainage channels (farmland) and smaller unnamed streams which originate from local springs in the northern section of the site, with fewer streams in the southern half due to topography and use of the site for commercial forestry

Surface water runoff on the Proposed Development site itself drains east-southeast to the sea via sheet flow into three existing manmade drainage channels, located along the eastern site boundary. A spring identified on historic OS maps as St. Vouge's well was observed on the southeast of the site, draining southeast to the sea.

Based on the GSI bedrock map of the region, the Proposed Development is underlain by the Glencar Limestone Formation (CDGCAR), which consists of calcareous shales and limestones, and the Benbulben Shale Formation (CDBENS), which consists of calcareous shales. These rock formations are classified by the GSI as 'Locally important aquifers – bedrock which is moderately productive only in local zones.' This aquifer classification extends northwards from the site towards Dromore West and Templeboy village, as far as the coastline. The depth to which groundwater varies in the Proposed Development was not noted as part of the original EIS prepared for the Dunneill Wind Farm below ground level (bgl). The groundwater flow, however, is known to generally flow to the north.

Groundwater vulnerability is generally mapped as varying between High (H) and Extreme (E) across the area of the Proposed Development. Most of the site for the Proposed Development falls under the category of High (H).

The existing wind farm infrastructure is partly located within the Ox Mountains SAC. However, as there are no groundworks or construction works proposed as part of the Proposed Development, it is not expected that there will be any negative effects associated with the proximity to the Ox Mountains SAC. The Proposed Development has been operational as a Wind Farm since 2010, and no negative effects have been observed in relation to the Ox Mountains SAC. There is limited potential for impacts in the form of surface water deterioration during the operational phase of the wind farm. Potential impacts will be prevented by adherence to the mitigation measures as described in Chapter 9. Therefore, no impacts are envisaged during the operational phase.

Mitigation measures currently in place at the operational wind farm to ensure the protection of all downstream receiving waters (surface and groundwater) will be continued should the application for extension of the operational period be granted. In conclusion, no significant effects on the water environment are envisaged during the operational stage of the Proposed Development.

Air and Climate

Air Quality

This chapter identifies, describes and assesses the potential significant direct and indirect effects on air quality and climate arising from the operation and decommissioning of the Proposed Development. The Environmental Protection Agency (EPA) has designated four Air Quality Zones for Ireland:

- Zone A: Dublin City and environs
- Zone B: Cork City and environs
- Zone C: 16 urban areas with population greater than 15,000

- Zone D: Remainder of the country

These zones were defined to meet the criteria for air quality monitoring, assessment and management described in the Clean Air for Europe (CAFE) Directive (as amended) and the Fourth Daughter Directive. The site of the Proposed Development lies within Zone D, which represents rural areas located away from large population centres.

Due to the non-industrial nature of the proposed development and the general character of the surrounding environment, air quality sampling was deemed to be unnecessary for this EIAR.

The production of energy from wind turbines has no direct emissions as is expected from fossil fuel-based power stations. Harnessing more energy by means of wind farms will reduce dependency on fossil fuels, thereby resulting in a reduction in harmful emissions that can be damaging to human health and the environment.

Exhaust emissions associated with the operational phase of the Proposed Development will arise from machinery and vehicles that are intermittently required on-site for maintenance. This will give rise to a long-term, imperceptible, negative impact however with implementation of mitigation measures outlined, was assessed as having no significant direct or indirect effects upon air quality and human health.

Climate Change and Carbon Balance Calculations

Climate change is one of the most challenging global issues facing us today and is primarily the result of increased levels of greenhouse gases (GHGs) in the atmosphere. These greenhouse gases come primarily from the combustion of fossil fuels in energy use. Changing climate patterns are linked to increased frequency of extreme weather conditions such as storms, floods and droughts. In addition, warmer weather trends can place pressure on animals and plants that cannot adapt to a rapidly changing environment. Moving away from our reliance on coal, oil and other fossil fuel-driven power plants is essential to reduce emissions of greenhouse gases and combat climate change.

The Climate Action Plan 2019 (CAP) was published on the 1st of August 2019 by the Department of Communications, Climate Action and Environment. The CAP sets out an ambitious course of action over the coming years to address the impacts which climate may have on Ireland’s environment, society, economic and natural resources. This Plan clearly recognises that Ireland must significantly step up its commitments to tackle climate disruption. In order to help reduce carbon dioxide (CO_2) emissions and reach our 2030 and 2050 emissions targets, the CAP has set out a list of renewable energy goals which includes implementing up to 8.2 GW total of increased onshore wind capacity on the island.

The Environmental Protection Agency (EPA) publish Ireland’s Greenhouse Gas Emission Projections and at the time of writing, the most recent report, ‘Ireland’s Greenhouse Gas Emissions Projections 2020–2040’ was published in June 2021. The report includes an assessment of Ireland’s progress towards achieving its emission reduction targets out to 2020, 2030 and 2040 set under the EU Effort Sharing Decision (ESD) and Effort Sharing Regulation (ESR).

The Proposed Development can assist in reaching national targets not only by fulfilling the implementation of renewable energy (with a generating capacity of c11MW), but it also has the capacity to offset 163,905 tonnes of CO_2 in its proposed 15-year operational lifetime, thereby reducing the GHG effect and improving air quality as we transition to cleaner energy industries.

The proposed project will assist in reducing CO_2 emissions that would otherwise arise if the same energy that the proposed wind farm will generate were otherwise to be generated by conventional fossil fuel plants. This is a long-term significant positive effect. The overall significance upon climate from the proposed extended operation of the wind farm was assessed as a direct, long-term slight positive effect.

Noise and Vibration

SSE Renewables and HMPL have collaborated in the assessment of likely environmental noise and vibration impacts of the proposed extension of operation of the Dunneill Wind Farm.

The methodology adopted for the assessment includes the review of the noise limits applied to the existing development through the relevant conditions of consent and previously completed noise monitoring surveys undertaken at the existing development. Comments have been made on noise levels recorded during the most recent monitoring surveys against the appropriate operational phase noise limits imposed in the relevant conditions of consent, as well as an assessment undertaken pertaining to the effects arising from general maintenance of works to be undertaken during the proposed period of operations and during decommissioning.

The background noise environment has been established through a noise survey conducted from 6th October 2021 to 4th November 2021 at two residential dwellings. The derived prevailing operational noise levels include all sources of noise in the area and not just that associated with the Dunneill wind turbines themselves. In order to minimise corruption from other sources such as residential activities, birdsong and occasional traffic movements, only measurement data obtained during the night was used to inform the analysis.

The results indicate that the site is operating in compliance with its associated condition requirements in terms of operational noise. Furthermore, as the measurements were undertaken at the two properties located closest to the wind farm site it is considered that compliance can also be inferred at dwellings located further away from the development.

When considering a development of this nature, the potential noise and vibration effects on the surroundings must be considered for two stages: the short-term decommissioning phase and the long-term operational phase.

The assessment of decommissioning noise and vibration and has been conducted in accordance best practice guidance contained in BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise and BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Vibration. Subject to good working practice as recommended in the EIAR Chapter, noise associated with the decommissioning phase is not expected to exceed the recommended limit values. The associated noise and vibration are not expected to cause any significant effects.

Due to the implementation of a comprehensive maintenance regime since the commissioning of the wind farm, it is concluded that there is no likelihood of increased noise emissions arising from the Proposed Development. This assessment concludes, therefore, that there is no likelihood of significant adverse noise effects arising from the continued operation of the Dunneill Wind Farm for a further period of 15 years.

Cultural Heritage

The archaeological, architectural, and cultural heritage chapter was prepared by Tobar Archaeological Services. It presents the results of an archaeological, architectural and cultural heritage impact assessment for the Proposed Extension of Operation of the Existing Wind Dunneill Wind Farm, County Sligo. The site comprises largely green field agricultural land and commercial forestry. The purpose of this chapter is to assess the potential direct and indirect effects of the Proposed Development on the surrounding archaeological, architectural and cultural heritage landscape.

The assessment is based on both a desktop review of the available cultural heritage and archaeological data and a comprehensive programme of field walking of the study area. Planning permission is being sought from Sligo County Council to enable the existing wind farm to continue operating in its current form for an additional 15 years. It is not proposed to alter the current 13 turbine layout or infrastructure and no ground works are required.

An assessment of all National Monuments (State Care and Preservation Orders) within 10km of the turbines was undertaken to ascertain any potential impacts on their visual setting (See Section 13.2.5 for methodology of assessment). No National Monuments are located within the Proposed Development site and none are located within close proximity to same. Monuments located outside 10km of the turbines are detailed in Figure 12-2 in the EIAR chapter.

There are no monuments listed in Sites and Monuments Records that are located within the site boundary. In terms of the general context within which the existing and Proposed Development is located, thirty-seven monuments are located within 2km of the nearest turbines outside the EIAR site boundary. The majority of monument types are ringforts and enclosures (12) and one souterrain. Two burnt mounds and three fulachta fia are located within 2km as well as seven Megalithic tombs, one stone circle and one stone row. Other monuments include huts sites (2) a Holy well and a number of redundant records (2). None will be impacted either directly or indirectly since nothing additional to the existing baseline environment is being proposed.

No NIAH structures are located within 2km of the nearest turbine. None will be impacted either directly or indirectly since nothing additional to the existing baseline environment is being proposed.

No built heritage structures which are subject to statutory protection in the Record of Protected Structures (RPS), or the National Inventory of Architectural Heritage (NIAH) are located within the Proposed Development boundary. RPS Structures within 2km are included in the assessment order to assess the wider context of the wind farm. The RPS is largely based on the NIAH and therefore some repetition/overlap occurs between both datasets. All RPS and NIAH structures within 2km of the nearest turbine are detailed in Table 12-2 in the EIAR chapter and are also represented on Figure 12-3. None will be impacted either directly or indirectly since nothing additional to the existing baseline environment is being proposed.

An assessment of cumulative impacts was undertaken taking into consideration the grid connection and additional existing windfarms within 20km of the Proposed Development. All construction works were carried out previously and none are being proposed as part of the Proposed Development. No direct impacts were identified during this assessment and therefore no cumulative direct effects will occur. Nothing additional is being proposed as part of the operational stage and therefore cumulative indirect effects will not occur.

Landscape and Visual

The Dunneill Wind Farm is an existing facility and this EIAR is being prepared in support of a planning application to extend the operational lifespan of the wind farm beyond 2024, by a further 15 years.

The Dunneill Wind Farm and associated infrastructure was well designed and fits coherently within its landscape setting in terms of its layout, spatial extent and scale.

The majority of landscape and visual receptors located the wider LVIA Study Area are not adversely affected by the Dunneill Wind Farm. The majority of the landscape in the LVIA Study Area is located outside of the zone of theoretical visibility of the Dunneill Wind Farm as a result of the surrounding topography of the Ox Mountains. Additionally, any actual views towards the site within the LVIA Study Area are localised, and it is considered that beyond 7km there will be generally very limited visibility of the turbines in any case.

Landscape features of higher sensitivity with visibility of the Dunneill Wind Farm were assessed based on site visits and using the viewpoint assessment methodology that follows best practice guidance for

LVIA. No significant landscape effects were recorded for any of the sensitive landscape features identified as a result of the Dunneill Wind Farm. In terms of landscape character, only the Easky Kingsmountain LCA (provisionally prepared by MKO), in which the Dunneill Wind Farm turbines are located, experience direct effects on landscape character as a result of the Dunneill Wind Farm. Any other effects on other LCAs are indirect, as visibility of the Dunneill Wind Farm is limited due to the scale and siting of the turbines. A residual landscape effect of Slight Significance was deemed to arise in relation landscape effects on the Easky Kingsmountain LCA, and residual landscape effects of Not Significant were deemed to arise at in the other LCAs included in the assessment of effects on landscape character.

In terms of cumulative landscape effects, there was no LCA where the cumulative landscape status would change as a result of the decommissioning of the Dunneill wind turbines, and inversely the extension of duration of the turbines would not cause any change in the cumulative landscape status. In relation to the other LCAs assessed, the presence of other wind farms, within and visible from these LCAs, means that the decommissioning and removal of the Dunneill wind turbines would also not change the cumulative landscape status. Therefore, it is considered that there will be no Significant cumulative landscape effects as a result of the proposed extension of duration of the Dunneill turbines.

The landscape area within which the Dunneill Wind Farm is located is remote, with limited numbers of residential receptors and settlements. As a result, most locations, where there are both sensitive receptors and open visibility of the majority of the turbines in the Dunneill Wind Farm tend not to be located in close proximity, reducing the spatial extent and size of the turbines from sensitive locations where they are likely to be viewed from.

The assessment of visual effects concluded that residual visual effects of 'Moderate' were deemed to arise at two of the 9 viewpoint locations. All other viewpoints assessed resulted in 'Slight' (6) and 'Not Significant' (1) residual visual effects.

Furthermore, it was shown that visibility is greatly restricted by the surrounding topography and actual visibility is further restricted by the effects of localised screening elements common throughout the landscape area where there is theoretical visibility of the Dunneill Wind Farm. Therefore, the turbine locations and heights are considered appropriate for the Dunneill Wind Farm.

In conclusion, Significant landscape and visual effects are not deemed to arise as a result of the Dunneill Wind Farm at present and such Significant effects will not occur as a result of the continued operation of the Wind Farm.

Material Assets

Traffic and Transport

The existing wind farm is accessed via two existing entrances from the third-class/local road that bisects the site. One site entrance turns south towards the southern part of the wind farm (T9 – T13), and a second entrance turns north from the local road towards the northern area of the wind farm (T1 – T8). Both site entrances, either side of the local road are used for day-to-day maintenance and monitoring of the wind farm and substation.

Since the Dunneill Wind Farm is currently operational, and since no changes to the wind farm are proposed, there is no construction phase associated with the proposed extension of life of the wind farm. There will therefore be no new traffic generated by the Proposed Development.

During the operational phase, the wind farm will continue to be remotely monitored. Traffic associated with the operational phase of the wind farm will be from SSE personnel visiting the onsite substation and control building, and maintenance personnel who will visit individual turbines.

It is estimated that the traffic volumes that will be generated by the development during its continued operation will be minimal. The site will generate maintenance trips, with approximately two maintenance staff travelling to site at any one time.

During the operational phase the majority of maintenance works on the site will be completed by a two-person team travelling in a light goods vehicle. Maintenance crews will be required on-site to complete major component replacements (e.g., turbine component changes or onsite control building maintenance) on a sporadic basis. Typically, there are no more than two trips per day to the site made by car or light goods vehicle. The direct effect on the surrounding road network will be neutral, and long-term, given the very low volume of daily trips to the site.

With the implementation of a Traffic Management Plan during future decommissioning works at the site, there will be no significant effect on traffic and transport resulting from the decommissioning phase.

Telecommunications and Aviation

Wind turbines, like all large structures, have the potential to interfere with broadcast signals, by acting as a physical barrier or causing a degree of scattering to microwave links. The most significant effect at a domestic level relates to a possible flicker effect caused by the moving rotor, affecting, for example, radio signals. The most significant potential effect occurs where the wind farm is directly in line with the transmitter radio path.

Wind turbines have the potential to affect other signal types used for communication and navigational systems, for example tower-to-tower microwave communication links, and airborne and ground radar systems. Interference with radar systems occurs when wind turbines are located close to an airport or directly in line with the instrument landing approach. These effects are generally easily dealt with by detailed micro-siting of turbines in order to avoid alignment with signal paths or by the use of repeater relay links out of line with the wind farm.

The existing Dunneill Wind Farm has been operational for nearly 12 years, and during its period of operation, SSE have not been aware of any complaints from telecommunications service provides regarding interference to service associated with the wind farm. In an email dated 16th May 2021, the Broadcasting Authority of Ireland (BAI) stated, *"...we are not aware of any issues from existing wind farms into existing FM networks. Also, the proposed wind farms are not located close to any existing or planned FM transmission sites".* There will be no significant direct or indirect effect on telecommunications from the Proposed Development.

To date no scoping response has been received from the Irish Aviation Authority (IAA). However, the existing Dunneill Wind Farm has been operational for 12 years and no aviation issues have arisen in that time. No changes to the existing wind farm layout or dimensions are proposed. There will be no significant direct or indirect effects on aviation operations to the Proposed Development. To date,

Interaction of the Foregoing

The preceding Chapters 5 to 14 of this Environmental Impact Assessment Report (EIAR) identify the potential significant environmental effects that may occur in terms of Population and Human Health, Biodiversity (Flora and Fauna) Ornithology (Birds), Land, Soils and Geology, Water (Hydrology and Hydrogeology), Air and Climate, Noise and Vibration, Cultural Heritage (Archaeological, Architectural and Cultural Heritage), Landscape and Visual, and Material Assets (Roads and Traffic, Telecommunications and Aviation) as a result of the Proposed Development.

All of the likely significant effects of the development and the measures implemented to mitigate them were outlined in the relevant sections of this report. However, for any development with the potential for significant environmental effects there is also the potential for interaction amongst these potential significant effects. The result of interactive effects may exacerbate the magnitude of the effects or ameliorate them or have a neutral effect.

A matrix is presented in Table 15-1 of Chapter 15 to identify potential interactions of impacts between the various aspects of the environment already assessed in this EIAR. The matrix highlights the occurrence of potential positive or negative effects of the Proposed Development. The matrix is symmetric, with each environmental component addressed in the previous sections of this EIAR being placed on both axes of a matrix, and therefore, each potential interaction is identified twice.

Potential interactions have been identified between effects on Population and Human Health and effects on Land, Soils and Geology, Water, Air and Climate, Noise and Vibration, Landscape and Visual and Material Assets. Potential interactions have been identified between effects on Biodiversity, Flora and Fauna and effects on Land, Soils and Geology, Water, Air and Climate, Noise and Vibration, and Landscape and Visual. Potential effects have been identified between effects on Ornithology and effects on Water, Air and Climate, and Noise and Vibration. Potential interactions have been identified between Land, Soils and Geology with effects on Water, Air and Climate, Cultural Heritage, and Landscape and Visual. Furthermore, potential interactions have been identified between effects on Air and Climate and Traffic (Material Assets), and finally potential interactions were identified between effects on Landscape and Visual with effects on Cultural Heritage.

Where any potential interactive negative impacts have been identified in the above Chapter 15, a full suite of appropriate mitigation measures has already been included in the relevant sections (Chapters 5-14) of the EIAR. The implementation of these mitigation measures will reduce or remove the potential for these effects. Information on potential residual impacts and the significance of effects, is also presented in each relevant chapter.

1. INTRODUCTION

1.1 Introduction

This Environmental Impact Assessment Report (EIAR) has been prepared by McCarthy Keville O'Sullivan Ltd. (MKO) on behalf of Brickmount Ltd. who intend to apply to Sligo County Council (SCC) for planning permission to extend the operational life of the existing Dunneill Wind Farm and all associated infrastructure for a further period of 15 years in the three townlands of Crowagh or Dunneill Mountain, Tawnadremira, and Ballyglass.

The Proposed Development is located approximately 3.5 kilometres (km) south of the village of Dromore West and approximately 3.7 km southwest of the village of Templeboy in County Sligo. The approximate grid reference location for the centre of the site is ITM E544576 N829278.

The Proposed Development is being brought forward in response to local, national, regional and European policy regarding Ireland's transition to a low carbon economy and associated climate change policy objectives.

The existing wind farm consists of 13 No. Vestas V52 850-kilowatt (kW) turbines with a blade tip height of 75m (49m tower, 52m rotor diameter). The existing wind farm, which became operational in 2010, has a total rated capacity of c.11 Megawatts (MW).

The Proposed Development is below the threshold for wind energy set out in the Seventh Schedule of the Planning and Development Acts 2000 to 2020 and is therefore not considered as a Strategic Infrastructure Development (SID), and as such, Sligo County Council are the planning authority.

This EIAR accompanies the planning application for the Proposed Development submitted to Sligo County Council. The planning application is also accompanied by a Natura Impact Statement (NIS) also prepared by MKO.

Access to the site for general traffic such as maintenance vehicles is via the current existing entrances to the northern and southern halves of the wind farm site from a third-class/local road that bisects the site. The site comprises two distinct areas, north and south of the unnamed third-class road. This unnamed third-class road can be accessed from the L2702 Local Access Road to the west which runs in a north-south direction between Dunneill and the N59 National Road to the north, as shown on Figure 1-1 below.

The existing wind farm became operational in 2010 and is connected to the National Grid by a medium voltage 20 kilovolt (kV) underground cable between the existing 20kV substation at Dunneill Wind Farm and the existing Cunghill 110 kV Substation, located approximately 20km southeast of the Proposed Development.

However, it should be noted that as the grid connection does not form part of the Proposed Development, as defined in Chapter 4 of this EIAR, and does not form part of the accompanying planning application. The grid connection is assessed as a cumulative project only within this EIAR.

The planning background for Dunneill Wind Farm is detailed further in Chapter 2: Background to the Proposed Development and Chapter 4: Description of the Proposed Development.

No construction activities or alterations to the existing wind farm are proposed beyond routine maintenance of the turbines and electrical infrastructure during the operational phase of the Proposed Development.

The existing Dunneill Wind Farm was first granted planning permission by Sligo County Council in 2003 (Pl. Ref. 03/619). This permission was subsequently appealed to An Bord Pleanála (ABP Pl. Ref. 21.204790), which upheld the decision to grant and issued planning permission for the wind farm in March 2004. An Environmental Impact Statement (EIS) was prepared and submitted as part of the initial planning application. An extension to the duration of the planning permission (to March 2011) was granted by Sligo County Council in March 2009, to allow for building of the wind farm. The Dunneill Wind Farm was subsequently developed and became operational in 2010 with electricity being supplied to the grid.

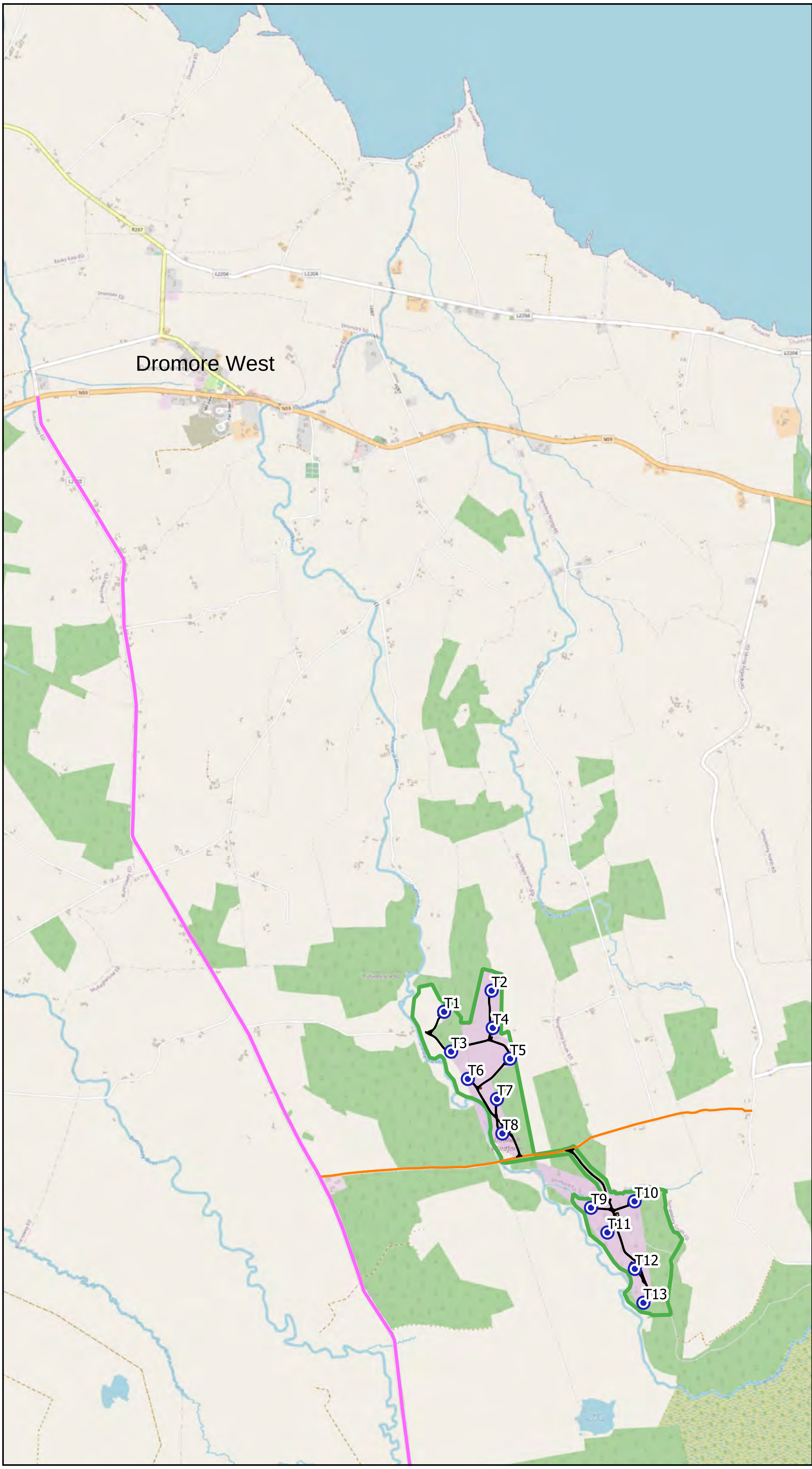
The wind farm has therefore been operational for approximately 12 years to date, with the current planning permission set to expire in March 2024. Condition No. 8 of Pl. Ref. 03/619 states that the continued operation of Dunneill Wind Farm beyond the permission date should be subject to further planning permission being granted. By March 2024, the existing turbines will have been in operation for only 14 years, whereas the normal operational life of a turbine is 25 to 30 years. It is therefore intended to apply for a 15-year extension to the operation life of the Dunneill Wind Farm.

A full description of the Proposed Development for the purposes of the planning application and the additional elements that form part of the overall project, assessed in this EIAR, are contained in Chapter 4 of this EIAR.

The townlands within which the Proposed Development and ancillary infrastructure are located are listed in Table 1-1. A site location map is provided as Figure 1-1.

Table 1-1 Townlands within which the Proposed Development is located.

Element of Proposed Development	Townland
Wind turbines, site access roads	Crowagh (or Dunneill Mountain), Tawnadremira, Ballyglass
Wind Farm Control building	Tawnadremira
Meteorological mast	Ballyglass



Map Legend

- EIAR Site Boundary
- Existing Dunneill Turbines
- Existing Dunneill Footprint
- L2702 Local Road
- Unnamed 3rd Class Road

Drawing Title: Dunneill Site Location	
Project Title: Dunneill Wind Farm Extension of Operation	
Drawn By: DN	Checked By: MW
Project No.: 210207	Drawing No.: Figure 1-1
Scale: 1:30000	Date: 04.04.2022

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1.2 Legislative Context

1.2.1 Environmental Impact Assessment

The consolidated European Union Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive'), was transposed into Irish planning legislation by the Planning and Development Acts 2000 to 2019 and the Planning and Development Regulations 2001 to 2019. The EIA Directive was amended by Directive 2014/52/EU which has been transposed into Irish law with the recent European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018).

Accordingly, this EIAR complies with the EIA Directive as amended by Directive 2014/52/EU. To the extent relevant and necessary, regard has been had to the existing provisions of the Planning and Development Act 2000 to 2019 and the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.

The European Union Directive 2011/92/EU, amended by EU Directive 2014/52/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive'), requires Member States to ensure that a competent authority carries out an assessment of the likely significant effects of certain types of project, as listed in the Directive's, prior to development consent being given for the project. This EIAR complies with the EIA Directive as amended by Directive 2014/52/EU. The Environmental Impact Assessment (EIA) of the Proposed Development will be undertaken by Sligo County Council as the competent authority. Article 5 of the EIA Directive as amended by Directive 2014/52/EU provides where an EIA is required, the developer shall prepare and submit an environmental impact assessment report (EIAR). The information to be provided by the developer shall include at least:

a) *A description of the project comprising information on the site, design, size and other relevant features of the project;*
b) *a description of the likely significant effects of the project on the environment;*
c) *a description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;*
d) *a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment; and,*
e) *a non-technical summary of the information referred to in points (a) to (d); and (f) any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected.*

In addition, Schedule 6 to the Planning and Development Act 2000 to 2019 sets out the information to be contained in an EIAR, with which this EIAR complies.

MKO was appointed as environmental consultant on the Proposed Development and commissioned to prepare this EIAR in accordance with the requirements of the EIA Directive as amended by Directive 2014/52/EU.

The relevant classes/scales of development that require EIA are set out in Schedule 5 of the Planning and Development Regulations 2001 to 2020. The relevant class of development in this case relates to "installations for the harnessing of wind power for energy production (wind farms) with more than 5 turbines or having a total output greater than 5 megawatts", as per paragraph 3(i) of Part 2 of Schedule 5. The Proposed Development exceeds 5 turbines and 5 MW in scale, and therefore is required to be subject to EIA. However, as the Proposed Development is an existing wind farm rather than a new installation, paragraph 15(a) has also been considered which relate to *"Any change or extension of development which would:-*

(i) result in the development being of a class listed in Part 1 or paragraphs 1 to 12 of Part 2 of this Schedule, and
(ii) result in an increase in size greater than-

- *25 per cent, or*

- *an amount equal to 50 per cent of the appropriate threshold,*

whichever is the greater."

While the Proposed Development seeks to extend the operation of the existing Dunneill Wind Farm, no changes to the existing wind farm infrastructure are proposed.

An EIAR has been prepared with respect to paragraph 3(i) of Part 2 of Schedule 5 (i.e., more than 5 turbines and/or a total output greater than 5 megawatts).

The EIAR provides information on the receiving environment and assesses the likely significant effects of the proposed project on it and proposes mitigation measures to avoid or reduce these effects. The function of the EIAR is to provide information to allow the competent authority to conduct the EIA of the proposed project.

All elements of the overall project, including the wind turbines and associated infrastructure (substation, site access roads, meteorological mast) have been assessed as part of this EIAR.

1.2.2 EIAR Guidance

The Environmental Protection Agency (EPA) published its 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, May 2022), which is intended to guide practitioners preparing an EIAR in line with the requirements set out in the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018).

In preparing this EIAR regard has also been taken of the provisions of the 'Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment', published by the Department of Housing, Planning and Local Government (DHPLG) in August 2018 to the extent these guidelines are relevant having regard to the enactment of the revised EIA Directive.

The European Commission also published a number of guidance documents in December 2017 in relation to Environmental Impact Assessment of Projects (Directive 2011/92/EU as amended by 2014/52/EU) including 'Guidance on Screening', 'Guidance on Scoping' and 'Guidance on the preparation of the Environmental Impact Assessment Report'. MKO has prepared the EIAR with regard to these guidelines also.

1.2.3 Wind Energy Development Guidelines for Planning Authorities

The relevant considerations under the *Wind Energy Development Guidelines for Planning Authorities* (Department of the Environment, Heritage and Local Government (DEHLG, 2006) have also been taken into account in this EIAR.

The *Wind Energy Development Guidelines for Planning Authorities* (DEHLG, 2006) were the subject of a targeted review in 2013. The proposed changes to the assessment of impacts associated with onshore wind energy developments are outlined in the document *Proposed Revisions to Wind Energy Development Guidelines 2006 – Targeted Review* (December 2013). A consultation process in relation to the document is currently being undertaken by the Department of Communications, Climate Action and Environment (DCCAE) and as of December 2019, the proposed changes to the assessment of impacts associated with onshore wind energy developments are outlined in the document *Draft Revised Wind Energy Development Guidelines* (December 2019). A consultation process in relation to the 2019 document commenced on the 12th December 2019 and concluded on February 19th, 2020. The final *Revised Wind Energy Development Guidelines* have yet to be published by the Department of Housing, Planning and Local Government (DHPLG).

At time of writing, the *2019 Draft Guidelines* have not yet been adopted, and the relevant guidelines for the purposes of Section 28 of the Planning and Development Act 2000, as amended, remain those published, issued in 2006.

There are eight no. residential properties located within 500m of a turbine. Of these eight properties, four are derelict properties, three are third party dwellings, and one is a participating landowner.

The visual amenity setback distance to residential dwellings will achieve the proposed 4-times turbine tip-height of 300m in all cases. A full assessment of relevant setback distances is included in Chapters 5, 11 and 13 of this EIAR.

1.3 The Applicant

The applicant for the Proposed Development, Brickmount Ltd., are a wholly owned subsidiary company of SSE Renewable (Ireland) Ltd. (SSE). SSE are committed to the development of renewable energy as part of the transition to a low-carbon future, including onshore wind. They currently own, operate and maintain 19 wind farms in the Republic of Ireland, and co-own Ireland's largest wind farm, Galway Wind Park, cumulatively producing 700MW of power. SSE Renewables have a proven track record of delivering wind energy products in Ireland for over 20 years.

1.4 Brief Description of the Proposed Development

Brickmount Ltd (the Applicant) is seeking planning permission to extend the operational lifetime of the existing Dunneill Wind Farm, a 13-turbine wind energy development on a hectare (ha) site at Dunneill, approximately 3.5 kilometres (km) south of the village of Dromore West and approximately 3.7 km southwest of the village of Templeboy in County Sligo. The Proposed Development is located within the townlands of Crowagh or Dunneill Mountain, Tawnadremira, and Ballyglass by a further 15 years.

The application seeks a fifteen (15) year planning permission for continuation of the operational life of the existing wind farm (SCC Reg. Ref. 03/619 & ABP Pl. Ref. 21.204790, as amended by SCC Reg. Ref 10/371 and 10/388) from the date of expiration (March 2024) of the current permissions. No modifications are proposed to the existing windfarm which comprises the following elements:

a) *13 no. existing Vestas V52 850 kilowatt (kW) wind turbines with a maximum overall blade tip height of 75 metres (m).*
b) *Existing 1 no. onsite 20 kilovolt (kV) electrical substation compound which includes a control building, welfare facilities, associated electrical plant and equipment, security fencing, associated underground cabling and a foul waste holding tank.*
c) *Existing 1 no. permanent meteorological mast with a height of 50m and an associated concrete platform/base;*

d) *All associated existing underground electrical and communications cabling connecting the turbines to the on-site substation;*
e) *Existing site access tracks of circa 3.3 kilometres (km) total length, 3 no. car parking spaces and 13 no. turbine hardstands;*
f) *2 No. existing gated site entrances from an unnamed third-class public road which dissects the windfarm site into north and south;*
g) *Existing Site drainage; and,*
h) *All existing ancillary infrastructure, associated site fencing and signage.*

The wind farm has been operational for approximately 12 years to date. The planning permission for the wind farm was granted in 2004 for 20 years from the date of the grant. The current planning permission is therefore set to expire in March 2024. Condition No. 8 of Pl. Ref. 03/619 states that *"This permission is for a period of twenty years from the date of this order. The wind turbines including towers and blades shall then be removed unless, prior to the end of the period, planning permission shall have been granted for their retention for a further period".* By March 2024, the existing turbines will have been in operation for only 14 years, whereas the normal operational life of a turbine is 25 to 30 years. It is therefore intended to apply for planning permission to continue operation of the wind farm beyond the expiration of its current permission.

When originally designed, the layout of the Dunneill Wind Farm was constraints-led, thereby avoiding environmentally sensitive parts of the site. No change or upgrade to the existing site roads or layout is proposed. The Proposed Development makes use of the existing on-site access roads and tracks, with approximately 1.2km of existing roadway within the wind farm site boundary. Site roads are constructed of consolidated gravel with a running width of approximately 5m.

The Dunneill Wind Farm is connected to the National Grid via an existing medium voltage 20 kilovolt (kV) underground cable which runs east from Dunneill to Kingsmountain Wind Farm, and subsequently on to Cunghill 110 kV substation, located approximately 20 kilometres (km) southeast of the Dunneill wind farm. The grid connection is assessed as a cumulative project within this EIAR, as it was considered exempted development at the time of construction and was not subject to planning permission and therefore does not form part of the Proposed Development.

The Proposed Development comprises an extension of operation for the existing Dunneill Wind Farm, including wind turbines, control building, site access roads, and met mast have been assessed as part of this EIAR.

The Proposed Development is described in detail in Chapter 4 of this EIAR.

1.4.1 References to Proposed Development

For the purposes of this EIAR, where the 'Proposed Development' is referred to, this relates to all the project components described in detail in Chapter 4 of this EIAR. Where 'The Site' is referred to, this relates to the primary study area for the development, as delineated by the EIAR Site Boundary in green as shown on Figure 1-1. Individual topics for assessment purposes, i.e., each chapter, indicate the study area used for that topic. The actual site boundary for the purposes of the planning permission application occupies a similar area to the primary EIAR Site Boundary.

The EIAR Site Boundary encompasses an area of approximately 66ha. The development footprint of the Proposed Development measures approximately 2.8ha. This accounts for approximately 4.2% of the primary EIAR study area. The planning application site area red line boundary is detailed in Appendix 4-1 of this EIAR.

1.5 Need for the Proposed Development

1.5.1 Overview

In November 2021, the Government announced a renewable electricity target of 80% by 2030 as part of the governments Climate Action Plan. The Proposed Development would likely be operational until 2039 and would therefore contribute to this 2030 target. More recently, the EPA reported that Ireland is set to fall far short of all of its carbon emissions reduction targets for 2030, despite climate action measures in the National Development Plan (EPA, June 2022). The proposed extension of operation of the Dunneill Wind Farm is key to helping Ireland address these challenges as well as addressing the country's over-dependence on imported fossil fuels.

The need for the Proposed Development is driven by the following factors:

1. *A legal commitment from Ireland to limit greenhouse gas emissions under the Kyoto protocol to reduce global warming;*
2. *A requirement to increase Ireland's national energy security as set out in the Energy White Paper;*
3. *A requirement to diversify Irelands energy sources, with a view to achievement of national renewable energy targets and an avoidance of significant fines from the EU (the EU Renewables Directive);*
4. *Provision of cost-effective power production for Ireland which would deliver local benefits; and*
5. *Increasing energy price stability in Ireland through reducing an over reliance on imported gas.*

These factors are addressed in further detail below. Section 2.3 in Chapter 2 of this EIAR on Background to the Proposed Development, presents a full description of the international and national renewable energy policy context for the Proposed Development. Section 2.2 addresses climate change, including Ireland's current status with regard to meeting greenhouse gas emission reduction targets.

1.5.2 Climate Change and Greenhouse Gas Emissions

At the Paris Climate Conference of the Parties (COP21) in December 2015, 195 countries adopted the first-ever universal, legally binding global climate deal, referred to as 'The Paris Agreement'. The Paris Agreement sets out a global action plan to avoid dangerous climate change by limiting global warming to well below 2°C above pre-industrial levels. Under the Paris Agreement, the EU and Governments also agreed on the need for global emissions to peak as soon as possible, recognising that this will take longer for developing countries and to undertake rapid reductions thereafter in accordance with the best available science.

The International Panel on Climate Change (IPCC) has put forward its clear assessment that the window for action on climate change is rapidly closing and that renewable energy sources such as wind will have to grow from 30% of global electricity at present to 80% by 2050 if we are to limit global warming to below 2 degrees[1] and in accordance with the COP 21 agreement to limit global warming to well below 2°C above pre-industrial levels.

In this regard, the Government enacted the Climate Action and Low Carbon Development Act 2015 which provides for the approval of plans by the Government in relation to climate change for the purpose of pursuing the transition to a low carbon, climate resilient and environmentally sustainable economy.

[1] *IPCC Fifth Assessment Synthesis Report, Intergovernmental Panel on Climate Change AR5 Report*

The IPCC published an article on the 6th October 2018 titled '*Global Warming of 1.5°C*'[2], which notes the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas (GHG) emission pathways, in the context of mitigation pathways, strengthening of the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. It provided detail on the impact of climate change if emissions are not reduced.

The IPCC's Sixth Assessment Report[3] published in 2021 provides a stark assessment of global climate change and presents evidence that climate changes will increase in all regions of the globe over the coming decades and that much of the damage caused by climate change up to this point is now likely irreversible, such as the rise in sea levels over the 21st century. The Climate Status Report for Ireland 2020[4] similarly reflects on clear and distinct impacts arising from climate change effects within an Irish context:

- An increase in the number of warm spell days the last 60 years with very little change in cold spell duration;
- Annual precipitation was 6% higher in the period 1989–2018, compared with the 30-year period 1961–1990, and the decade 2006–2015 has been the wettest on record;
- Satellite observations indicate that the sea level around Ireland has risen by approximately 2–3mm per year since the early 1990s; and
- In 2018, carbon dioxide emissions were almost 18% higher than in 1990, primarily due to increased fossil fuel combustion in transport and energy industries

The IPCC's Sixth Assessment Report does not, however, conclude that a climate catastrophe is inevitable, but rather, there remains a 'narrow path' to determine the future course of climate, mainly by cutting emissions down to net zero. The Proposed Development will contribute to the decarbonisation of the energy sector and reduce harmful emissions. In this regard, it is in compliance with national and international climate change policy and targets.

The Energy White Paper notes that:

> *'The use of renewables in electricity generation in 2014 reduced CO_2 emissions by 2.6 Mt and avoided €255 million in fossil fuel imports'*

It is estimated that the Proposed Development has an output of up to approximately 11MW from 13 No. existing wind turbines. The Proposed Development is capable of displacing up to 10,927 tonnes of carbon dioxide (CO_2) per year, which would amount to 163,905 tonnes of carbon dioxide to be displaced over the entire 15-year duration of the Proposed Development. The carbon offsets resulting from the Proposed Development are described in detail in Chapter 10: Air and Climate, Section 10.3.3.

1.5.3 Energy Security

At a national level, Ireland currently has one of the highest external dependencies in the EU on imported sources of energy, such as coal, oil and natural gas.

A report by the Sustainable Energy Authority of Ireland (SEAI), published in September 2020 (Energy Security in Ireland, 2020 Report), presents national energy statistics on energy production and consumption in Ireland during 2018. Renewable energy sources (which include wind) accounted for 32.5% of Ireland's gross electricity consumption in 2018, which was well over halfway to Ireland's 2020 target of 40%. EirGrid in their 'All Island Generation Capacity Statement 2020 - 2029' (August 2020), states that new wind farms commissioned in Ireland in 2019 brought total wind capacity to over

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[2] *Global Warming of 1.5°C, Intergovernmental Panel on Climate Change, http://www.ipcc.ch/report/sr15/*
[3] *Climate Change 2021 'The Physical Science Basis' (Intergovernmental Panel on Climate Change, August 2021)*
[4] *Climate Status Report for Ireland 2020 (Environmental Protection Agency, Marine Institute, Met Éireann, August 2021)*

4,127MW, contributing to the increase in overall RES-E percentage to 35.7% with wind energy accounting for 32%.

It is estimated that in 2015 the cost of all energy imports to Ireland was approximately €4.6 billion; this fell to €3.4 billion in 2016 due mainly to reduced gas imports but increased again in 2017 to €4 billion. Irelands import dependency varied between 85% and 90% until 2016, where it fell to 69% with the Corrib gas field starting production and then has fallen further to 66% in 2017 but has increased again to 69% in 2019, however Ireland is still one of the more import dependent countries in the EU, with the EU average being just over 50%. In 2019, although noted that the cost of energy imports to Ireland was approximately €4.5 billion; renewables made up 12% of gross final consumption relative to a 2020 target of 16%. This avoided 5.8 million tonnes of CO2 emissions and €500 million of fossil fuel imports ('Energy in Ireland - 2020 Report, SEAI, December 2020).

Ireland continues to be hugely energy import-dependent leaving it exposed to large energy price fluctuations as a minimum and possibility of fuel shortages if a major energy crisis were to occur. The international fossil fuel market is growing increasingly expensive and is increasingly affected by international politics which can add to price fluctuations. This volatility will be increased as carbon prices increase in the future. This has implications for every Irish citizen. The SEAI has stated that our heavy dependence on imported fossil fuels, "is a lost opportunity in terms of keeping this money here in Ireland and further developing our abundant renewable resources".

The cost of carbon credits is included in all electricity traded, and the price of electricity generated by coal is particularly vulnerable due to its high carbon emissions per unit of electricity generated. Coal still generates almost 25% of Ireland's electricity, but the National Climate Policy calls for an aggregate reduction in carbon dioxide emissions of at least 80% (compared to 1990 levels) by 2050. Any steps to reduce this dependence on imported fossil fuels will add to financial autonomy and stability in Ireland. The use of Ireland's indigenous energy resources, such as wind, will contribute to a reduction in energy imports.

The Energy White Paper 2015 notes 'There will be a substantial increase in the cost of carbon in the short and medium term, through the EU Emissions Trading Scheme'. Any steps to reduce dependence on imported fossil fuels will add to financial autonomy and stability in Ireland. As the White Paper notes:

> '*In the longer term, fossil fuels will be largely replaced by renewable sources*'.

In a Communication from the European Parliament on Joint European Action for more affordable, secure and sustainable energy[5], the European Commission proposed an outline of a plan to make Europe independent from Russian fossil fuels well before 2030 in light of Russia's invasion of Ukraine. Commission President Ursula von der Leyen stated: "*We must become independent from Russian oil, coal and gas. We simply cannot rely on a supplier who explicitly threatens us. We need to act now to mitigate the impact of rising energy prices, diversify our gas supply for next winter and accelerate the clean energy transition. The quicker we switch to renewables and hydrogen, combined with more energy efficiency, the quicker we will be truly independent and master our energy system.".*

More recently, the European Commission published the REPowerEU Plan[6] in May 2022 in response to energy security concerns surrounding the dependence on imports of Russian fossil fuels and the subsequent fast forwarding of renewable energy alternatives. REPowerEU builds on the full implementation of the Fit for 55 proposals tabled last year without modifying the ambition of achieving

[5] *European Commission (March 2022) REPowerEU: Joint European Action for more affordable, secure and sustainable energy. Strasbourg.* https://ec.europa.eu/commission/presscorner/detail/en/ip_22_1511

[6] *European Commission (May 2022) REPowerEU: A plan to rapidly reduce dependence on Russian fossil fuels and fast forward the green transition.* https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A230%3AFIN&qid=1653033742483

at least -55 % net GHG emissions by 2030 and climate neutrality by 2050 in line with the European Green Deal. It will have a positive impact on EU's emission reduction over the decade. However, the fast phasing out of fossil fuel imports from Russia will affect the transition trajectory, or how we reach our climate target, compared to that under previous assumptions. The key outcomes and targets from the REPowerEU Plan includes the following;

- **Energy Savings** – Increasing the 2030 Energy Efficiency target from 9% to 13%.;
- **Renewable Energy Strategy (RES)** – Increasing the 2030 Renewable Energy Directive target from 40% in previous years proposal up to 45%.;
- Member States should as a matter of priority implement the permitting-related Country Specific Recommendations in the European Semester and already adopted Recovery and Resilience Plans. Equally, the full and rapid transposition by all Member States of the Renewable Energy Directive is a matter of urgency to simplify permitting procedures;
- The revised Renewable Energy Directive proposal operationalises the principle of renewable energy as an overriding public interest (IROPI), introduces the designation of 'go-to' areas and other ways to shorten and simplify permitting while also minimising potential risks and negative impacts on the environment. It also provides for the possibility to create regulatory sandboxes to foster innovation in the sector.

1.5.4 Competitiveness of Wind Energy

While Ireland has a range of renewable resources, as the White Paper states; '[Onshore Wind] is a proven technology and Ireland's abundant wind resource means that a wind generator in Ireland generates more electricity than similar installations in other countries. This results in a lower cost of support.'

In fact, the cost of support is more than offset by the fact that adding large quantities of wind to the wholesale market drives down auction prices in any half hour trading period when the wind is blowing, i.e., for 80% of the hours of the year. Wind is capable of an average capacity factor of 35%[7] , which is its average output throughout the year relative to its maximum output. However, wind is generating power at some level for 80% of the hours of the year. EirGrid's website has more detailed information. A Pöyry study from 2019[8] shows that if the increase from 40% renewables in 2020 to 70% renewables in 2030 is procured from CfD-supported renewables (e.g. RESS) at an average strike price of €60/MWh, there would be a net saving to the electricity consumer, under the commodity price assumptions used in this analysis of approximately €2.5 billion. The EU has noted that Ireland has one of the lowest costs of supporting renewables mainly because onshore wind is on a par with the cost of power from conventional generation when a full cost benefit analysis is undertaken.

1.5.5 EU 2030 Renewable Energy Targets

For RES-E alone, Ireland had set a national target of 40% by 2020 as outlined in National Renewable Energy Action Plan (NREAP). Government policies identify the development of renewable energy, including wind energy, as a primary strategy in implementing national energy policy.

The Energy in Ireland 2021 report, published December 2021, reported Ireland missed its 40% renewable energy target for 2020 with a share of renewable electricity recorded at 39.1%[9]. In addition, the EPA published data on its Greenhouse Gas emissions for the period 2021-2040 relative to EU 2030

[7] *Baringa (October 2018), 70 by 30 – a 70% Renewable Electricity Vision for Ireland in 2030 (Table A.6),. Report available at: https://www.iwea.com/images/files/70by30-report-final.pdf*
[8] *Pöyry (October 2019) – Cheaper and Greener: How renewable energy will deliver low-cost power to Irish homes and businesses. Report available at: https://windenergyireland.com/images/files/iwea-cheaper-and-greener-final-report.pdf*
[9] *Energy in Ireland 2020 (SEAI, December 2021) - https://www.seai.ie/publications/Energy-in-Ireland-2021_Final.pdf*

targets. As previously mentioned the latest EPA projections show that currently implemented measures (With Existing Measures) will achieve a reduction of 5% on 2005 levels by 2030, significantly short of the 30% reduction target[10].

The Climate Action and Low Carbon Development (Amendment) Act 2021 commits Ireland to reach a legally binding target of net-zero emissions no later than 2050, and a cut of 51% by 2030 (compared to 2018 levels). Under the 2021 Act, Ireland's national climate objective requires the state to pursue and achieve, by no later than the end of the year 2050, the transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy.

Ireland's statutory national climate objective and 2030 targets are aligned with Ireland's obligations under the Paris Agreement and with the European Union's objective to reduce GHG emissions by at least 55% by 2030, compared to 1990 levels and to achieve climate neutrality in the European Union by 2050.

In November 2021, the Government published the most recent Climate Action Plan 2021, announcing a renewable electricity target of 80% by 2030 for Ireland. This is a rise from the previous target of 70% by 2030, as announced in the Climate Action Plan 2019.

The Climate Action Plan 2021 states that in order to meet the required level of emissions reduction by 2030 and the 80% renewable electricity generation target by 2030, the installed generation capacity of onshore will need to reach 8GW and 5GW of offshore wind. As published by the SEAI in December 2021, the current installed onshore capacity in Ireland is 4.3MW. As noted previously, Ireland missed it's 2020 renewable energy target of 40% with a renewable share in electricity of 39.1%. With a renewable share of electricity generation at 80% in mind and a target of 8GW installed by 2030, it is now more critical than ever that we continue to progress renewable energy development in Ireland so that we are successful in meeting our 2030 targets. Further detail on the EU 2030 targets is noted in Chapter 2.

1.5.6 Increasing Energy Consumption

As detailed above, the Climate Action Plan identifies a need for 8.2GW of onshore wind generation in order for Ireland to meet its 2030 targets. In their '*All Island Generation Capacity Statement 2021 - 2030'* (September 2021), EirGrid estimate that 4.5 – 6.6 GW on-shore wind capacity would be required to meet the 2030 RES-E targets for Ireland.

Failure to meet Ireland's targets for renewable energy will result in substantial EU sanctions.The Department of Public Expenditure and Reform (DPER) in their report 'Future Expenditure Risks associated with Climate Change/Climate Finance'[11] concluded that *'potential costs of purchasing non-ETS GHG compliance for the Irish Exchequer for the 2020 to 2030 period could have a cumulative total in the billions in the absence of any further policy changes'*. If Ireland decided to backfill shortfalls in the RES-H target with additional renewable electricity this could significantly reduce these costs.

In April 2016[12] SEAI estimated the historic build rate for wind energy deployment as 180 MW per year since 2005. If this average build rate over the remaining period between 2018 and 2020 is assumed, then approximately 3.85 GW of wind would be built up to 2020. By January 2022, the installed wind capacity in the Republic of Ireland is over 4.3GW according to Wind Energy Ireland[13].

[10] *Ireland Greenhouse Gas Emissions Projections 2021-2040 (EPA June 2022)*
[11] https://igees.gov.ie/wp-content/uploads/2013/10/Future-Expenditure-Risks-associated-with-Climate-Change-Climate-Finance1.pdf
[12] https://www.seai.ie/Publications/Statistics_Publications/Energy_Modelling_Group_Publications/Ireland%E2%80%99s-Energy-Targets-Progress-Ambition-and-Impacts.pdf
[13] *https://windenergyireland.com/about-wind/facts-stats*

It is noted that the key driver for electricity demand in Ireland for the next number of years is the connection of new large energy users, such as data centres. This statement notes that '*Large industrial connections normally do not dominate a country's energy demand forecast but this is the case for Ireland at the moment*'[14]. EirGrid analysis shows that demand from data centres could account for 31% of all demand by 2027 in a median demand scenario (accounts for the connection of all 1400MVA of potential demand in the connection process). The median demand scenario is now higher than for last year's forecast for high demand, indicating the progression of many of the data centre projects.

In 2015, IWEA commissioned a study '*Data Centre Implications for Energy Use in Ireland'* which concluded that an extra approx. 1 Gigawatt (GW) of electricity demand could materialise between 2015 and 2020 due to growth in data centres. More recently, data available from Bitpower[15] at the end of 2020 noted that there are currently 66 operational data centres in Ireland, totalling 834MW; with an additional 778MW having received planning approval and 295MW under construction. The increase in growth of data centres means an increase in electricity demand, with many of the proposed data centres committing to using 100% renewable energy which will result in an increased demand for renewable electricity as detailed above.

In the context of increasing energy demand and prices, uncertainty in energy supply and the effects of climate change, our ability to harness renewable energy such as wind power plays a critical role in creating a sustainable future. The Department of the Environment, Climate and Communications set a target for Ireland of 70% of total electricity consumption to come from renewable resources by 2030, This target forms part of the Government's strategy to make the green economy a core component of its economic recovery plan for Ireland. It is envisaged that wind energy will provide the largest source of renewable energy in achieving this target.

Recent communications from SEAI[16] have noted that '*meeting 2020 renewable energy and energy efficiency targets could put Ireland on a low-carbon pathway and trajectory in terms of meeting future targets in 2030 and 2050.*

The Department of Communications, Energy & Natural Resources (DCENR) noted in their Draft Bioenergy Plan 2014, that achieving the anticipated renewable energy usage in the three energy sectors will be challenging, with the 12% for renewable heat being particularly so. SEAI estimate that the shortfall could be in the region of 2% to 4% of the 12% RES-H target. Given that individual member states 2030 targets are set at a more challenging level than 2020, fines could persist for an extended number of years, and so the total cost to Ireland could run to billions. For comparison, the entire wholesale electricity market has an annual value of around €3bn.

In the medium-term, with the introduction of electric vehicles and uptake of smart demand such as storage heating and heat pumps, emissions in the heat and transport sector will be substantially reduced. A high renewables electricity system is the foundation of such a transformation.

The Energy White Paper published by DCENR in December 2015 expanded on the vision set out above. It outlines a radical transition to a low carbon future which will involve amongst other things, *'generating our electricity from renewable sources of which we have a plentiful indigenous supply'* and *'Increasing our use of electricity and biogas to heat our homes and fuel our transport'*.

The DCENR confirmed in the publication of the White Paper '*Ireland's Transition to a Low Carbon Future' 2015 – 2030*, that wind is the cheapest form of renewable energy:

[14] *Eirgrid, SONI (2019). All-Island Generation Capacity Statement 2019-2028*
[15] *http://www.bitpower.ie/images/Reports/2020_H2_Report.pdf*
[16] https://www.seai.ie/resources/publications/Ireland___s-Energy-Targets-Progress-Ambition-and-Impacts.pdf

> *"(Onshore wind) is a proven technology and Ireland's abundant wind resource means that a wind generator in Ireland generates more electricity than similar installations in other countries. This results in a lower cost of support."*

EU countries have agreed on a new 2030 Framework for climate and energy, including EU-wide targets and policy objectives for the period between 2020 and 2030. These targets aim to help the EU achieve a more competitive, secure and sustainable energy system and to meet its long-term 2050 greenhouse gas reductions target. It is noted that a binding EU target of 32% for renewable energy by 2030 has been set by the EU 2030 Framework for Climate and Energy, with Ireland confirming its own targets for 2030 as detailed below.

Ireland will therefore have to meet even more demanding climate change and renewable energy supply obligations in order to play its part in achieving the European climate and energy ambitions. As announced in November 2021, the Irish Government have pledged to generate 80% of the country's electricity supply from renewable sources by 2030. The development of additional indigenous wind energy generating capacity, such as the Proposed Development to continue to produce renewable energy from the existing Dunneill Wind Farm for an additional 15 years, will not only help to reduce carbon emissions but will also improve Ireland's security of energy supply. Such penetration levels of wind are technically and economically feasible once paired with other energy system changes such as increasing electric vehicle penetration and electrification of heat. Further information on the 2030 commitments for Ireland are noted in Chapter 2, Section 2.2 and Section 2.3.

These sources of 'flexible demand' allow the system to match intermittent renewable energy resources with minimal extra cost. Additional interconnection is also planned with the UK and France, further assisting in the integration of wind (and in the future solar) on the power system.

A number of alternative energy types have been considered and assessed when considering how best to meet this renewable energy target.

In 2014, a report prepared by UK consultant BW Energy for the Rethink Pylons campaign group has suggested that converting Moneypoint generation station (which runs solely on coal) from coal to biomass would enable Ireland to meet 2020 renewable energy targets. Dr Brian Motherway, Chief Executive SEAI[17] refutes this claim. While Dr Motherway agrees that biomass offers benefits and is helping Ireland to move away from fossil fuels he states that "*the conversion of Moneypoint to biomass has been considered a number of times over the years, including actual trials of small amounts of biomass in the station. However, the technical and economic challenges have proven far greater than some would have us believe*".

The reason being that the move of Moneypoint from coal to biomass would not entail a clean swap. In fact, '*to allow for combustion of biomass, a full redesign and rebuild of much of the station would be required*'. In the UK where this has been done, energy generation stations have required significant financial support to make the process viable and with each unit of energy in the UK being worth approx. 13 cents, almost double that of Ireland which is approx. 7 cents, wind energy works out cheaper in Ireland. Also, the amount of biomass required to feed Moneypoint would require 300,000ha of land; an equivalent area of Counties Wexford and Carlow being planted with willow which is far more than Ireland currently produces which means we would need to import.

Importation raises the question; would this be cost effective? As prices are volatile and availability of biomass is difficult to predict Ireland would become dependent on the uncertainty of imported biomass. It is also noted that there will be emissions from transport and distribution. The further the biomass is transported, the greater the greenhouse gas emissions[18]. So, while biomass is currently contributing to a move to renewable energy production, on its own it is not the sole answer to meeting

[17] http://www.seai.ie/News_Events/Press_Releases/2014/Biomass-is-a-big-part-of-the-solution-but-not-the-whole-solution.html
[18] *Sustainability Criteria Options and Impacts for Irish Bioenergy Resources (SEAI 2019)*

Ireland's renewable energy targets. Ireland has a legal obligation to diversify its energy sources requiring the development of renewable energy to avoid substantial fines.

More recently, and with the 2030 targets being released; the Joint Committee on Climate Action has published its cross-party report entitled, '*Climate Change: A Cross- Party Consensus for Action*' (March 2019). This report highlights the requirements for alternate energy production. More specifically, the report notes that it is currently planned to stop burning coal at Moneypoint by 2025 as well as peat at Bord na Mona and ESB stations by 2030. In November 2021, the Department of Communications, Climate Action and Environment published its Climate Action Plan (CAP), which notes the need for renewable alternatives to coal and peat. Further information on the CAP can be seen in Chapter 2.

The Climate Action Plan 2021 states that in Ireland, total electricity demand over the next ten years is forecast to grow by between 19% and 50%, largely driven by new large energy users, many of which are data centres, based on existing policies and strategies. In the high demand scenario outlined in the Programme for Government, electricity demand will almost double by 2030, while electricity emissions are to be reduced by 60-80% at the same time. Underlying drivers of changes in electricity demand include:

- Data centres are forecast to continue to grow by up to ~9 TWh in 2030 (~2316% of total demand)
- Transport electricity demand is forecast to grow (~23% p.a.) as a result of fast uptake of EV charging
- Electrical heating in industry will increase by more than 2.5 times in 2030 from 2017 levels
- Building energy efficiency improvements from an extensive retrofit programme will moderate the growth in electricity demand from new heat pumps in buildings

Against this backdrop, the importance of wind energy as the main component of Ireland's renewable energy development is acknowledged, and wind energy is accepted as the main contributor to meeting the Country's national climate change and energy supply obligations. Notwithstanding this, it must also be acknowledged that not every part of Ireland is well endowed with wind resources and therefore, not all counties will be able to deliver wind-based renewable energy. Furthermore, whilst it is accepted that there are other renewable energy technologies in operation, for the foreseeable future many areas will be unable to deliver significant renewable energy output. This primarily applies to the more populous areas.

National and international renewable energy and climate change targets must be achieved, and it is crucial that these are appropriately translated and implemented at regional and local levels. Wind farm development and design involves balancing the sometimes-conflicting interests of constraints (e.g. natural and built heritage, human beings, ecological, ground conditions, hydrological, etc.) with visual amenity and the technological/economic requirements/realities of the specific project and turbines.

1.5.7 Reduction of Carbon Emissions and Other Greenhouse Gases

This production of renewable energy will assist in achieving the Government's and EU's stated goals of ensuring safe and secure energy supplies, promoting an energy future that is sustainable and competitively priced to consumers whilst combating energy price volatility and the effects of climate change. The Energy White Paper in 2015 outlines an ambitious GHG reduction target of between 80% to 95% compared to 1990 levels out to 2050. Furthermore, if national carbon emissions targets are divided out amongst each county, each Local Authority may be responsible for meeting its own targets.

In addition to a reduced dependence on oil and other imported fuels, the generation of electricity from wind by the Proposed Development will displace approximately 10,927 tonnes of carbon emissions per annum from the largely carbon-based traditional energy mix, the detail of which is presented in Section 10.3.3 of this EIAR.

Under WHO and EU estimates, more than 417,000 premature deaths are attributable to poor air quality in Europe annually ('*European Environmental Agency (EEA) Report, 'Air Quality in Europe – 2020 Report*'). The EPA report '*Air Quality in Ireland 2020*' noted that in Ireland, the premature deaths attributable to poor air quality are estimated at 1,300 people per annum. The EPA 2016 report '*Ireland's Environment – An Assessment*' states that the pollutants of most concern are NOx, (the collective term for the gases nitric oxide and nitrogen dioxide, PM (particulate matter) and O_3 (ozone). The EPA 2016 report goes on to state that:

> *'Ireland has considerable renewable energy resources, only a fraction of which are utilised to address our energy requirements.*
>
> ***Wind,** ocean, solar, hydro and geothermal energy do not produce GHG (greenhouse gas) emissions or emissions of air pollutants such as particulates, sulphur dioxide and nitrogen dioxide. Use of these renewable resources can have **considerable co-benefits for human health and ecosystems**. Meeting energy requirements from renewable resources can provide significant economic and employment benefits at local to national scales.'*

The Clean Air Strategy for Ireland[19] is currently in the consultation with the draft report published in March 2022. The draft report emphasises the importance of "non-combustion renewables such as wind and solar power in contributing to both climate and clean air goals. These schemes and supporting actions are supporting a gradual shift away from more polluting forms of power generation (e.g., coal and peat generation); to enable higher shares of renewables alongside gas fired generation".

The Proposed Development therefore represents an opportunity to further harness Ireland's significant renewable energy resources, with valuable benefits to air quality and in turn to human health. The consumption of fossil fuels for energy results in the release of particulates, sulphur dioxide and nitrogen dioxide to our air. The use of wind energy, by providing an alternative to electricity derived from coal, oil or gas-fired power stations, results in emission savings of carbon dioxide (CO_2), oxides of nitrogen (NOx), and sulphur dioxide SO_2, thereby resulting in cleaner air and associated positive health effects.

1.5.8 Economic Benefits

In addition to helping Ireland avoid significant fines and reducing environmentally damaging emissions, the proposed project will have significant economic benefits. At a national level, Ireland currently has one of the highest external dependencies in the EU on imported sources of energy, such as coal, oil and natural gas. As detailed above, in 2019 the cost of all energy imports to Ireland was approximately €4.5 billion with imported fossil fuels accounting for 57% of all energy consumed ('Energy in Ireland 2020, Sustainable Energy Authority of Ireland, December 2020).

The SEAI report 'Energy in Ireland 2020' indicated that renewable electricity (mostly wind energy):

- Displaced over €500 million of fossil fuel imports; and
- Reduced CO2 emissions by 5.8 million tonnes.

The 2014 report 'The Value of Wind Energy to Ireland', published by Pőyry, stated that growth of the wind sector in Ireland could support 23,850 jobs (construction and operational phases) by 2030. The reduction in fuel imports not only benefits security of supply but also creates a net transfer to the Irish

[19] *Department of the Environment, Climate and Communications (March 2022). Draft Clean Air Strategy Report – Public Consultation. https://assets.gov.ie/217981/40d0b204-df9a-40e8-8bee-644b86cd6eb2.pdf*

economy with large reductions in the energy import potentiality allowing for a saving of almost €671m of expenditure on fuel imports per annum by the time we reach 2030.

The Proposed Development will be capable of providing power to approximately 6,277 households every year, which is more than 9.6% of all County Sligo households.

At a Regional Level, the Proposed Development will help to supply the rising demand for electricity, resulting from renewed economic growth. The EirGrid report '*All-Island Generation Capacity Statement 2019 – 2028*' (SONI and EirGrid, 2019) notes that electricity demand on the island of Ireland is expected to grow by between 25% and 47% over the next ten years. Much of this growth is expected to come from new data centres in Ireland.

The Proposed Development will have several significant long-term benefits for the local economy including job creation, landowner payments, local authority commercial rate payments and a Community Benefit Scheme. In 2021, SSE Renewables presented more than €19,400 to community groups near the Dunneill Wind Farm. Including the 2021 calendar year, the Dunneill Community Fund brings the company's overall contribution in the region to €251,000 since 2010.

A total of 13 local groups benefited from the 2021 community fund contribution of €19,400, including schools, sports clubs and community organisations. The successful applicants included amongst others: Eoghan Rua Ladies FC, Owenbeg National School, Mayo Beekeepers Association Subgroup Dromore West Beekeepers, West Sligo Young at Heart and Templeboy Aughris Rural Action TARA.

Dunneill Wind Farm has contributed over €1 million in county council rates since 2010. The continued annual commercial rate payments from the Proposed Development to Sligo County Council, will be redirected to the provision of public services within Co. Sligo. These services include provisions such as road upkeep, fire services, environmental protection, street lighting, footpath maintenance etc. along with other community and cultural support initiatives.

It is estimated that the proposed extension of operation will maintain approximately 2-3 part-time roles in the wind farm operation and maintenance (O&M) which will endure throughout the project's lifetime. Additional employment will be created in the region through the supply of services and materials to the development. In addition to this, there will also be income generated by local employment from the purchase of local services i.e., travel and lodgings.

1.6 Purpose and Scope of the EIAR

The purpose of this EIAR is to document the current state of the environment in the vicinity of the Proposed Development and to quantify the likely significant effects of the Proposed Development on the environment in accordance with the requirements of the EIA Directive, as amended. The compilation of this document served to highlight any areas where mitigation measures may be necessary in order to protect the surrounding environment from the possibility of any negative impacts arising from the Proposed Development.

It is important to distinguish the Environmental Impact Assessment (EIA) to be carried out by the Planning Authority, from the EIAR and the accompanying planning application. The EIA is the assessment carried out by the competent authority, which includes an examination that identifies, describes and assesses in an appropriate manner, in the light of each individual case and in accordance with Articles 4 to 11 of the Environmental Impact Assessment Directive, the direct and indirect effects of the Proposed Development on the following:

a. population and human health
b. biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC
c. land, soil, water, air and climate

d. material assets, cultural heritage and the landscape
e. the interaction between the factors referred to in points (a) to (d)

The EIAR which will be submitted by the applicant provides the relevant environmental information to enable the EIA to be carried out by the competent authority. The information to be contained in the EIAR is prescribed Article 5 of the revised EIA Directive described in Section 1.4 above.

1.7 Structure and Content of the EIAR

1.7.1 General Structure

This EIAR uses the grouped structure method to describe the existing environment, the potential impacts of the Proposed Development thereon and the proposed mitigation measures. Background information relating to the Proposed Development, scoping and consultation undertaken and a description of the Proposed Development are presented in separate sections. The grouped format sections describe the impacts of the Proposed Development in terms of population and human health, biodiversity, ornithology, soils and geology, hydrology and hydrogeology, air and climate, noise and vibration, landscape and visual, cultural heritage and material assets such as traffic and transportation, together with the interaction of the foregoing.

The chapters of this EIAR are as follows:

1. Introduction
2. Background to the Proposed Development
3. Consideration of Reasonable Alternatives
4. Description of the Proposed Development
5. Population and Human Health (including Shadow Flicker)
6. Biodiversity (Flora and Fauna)
7. Ornithology (Birds)
8. Land, Soils and Geology
9. Water (Hydrology and Hydrogeology)
10. Air and Climate
11. Noise and Vibration
12. Archaeological, Architectural and Cultural Heritage
13. Landscape and Visual
14. Material Assets (including Traffic and Transport, Telecommunications and Aviation)
15. Interactions of the Foregoing
16. Schedule of Mitigation Measures

The EIAR also includes a non-technical summary, which is a condensed and easily comprehensible version of the EIAR document. The non-technical summary is laid out in a similar format to the main EIAR document and comprises a description of the Proposed Development followed by the existing environment, impacts and mitigation measures presented in the grouped format.

1.7.2 Description of Likely Significant Effects and Impacts

As stated in the *Guidelines on the Information to be contained in Environmental Impact Statements* (EPA, 2022), an assessment of the likely impacts of a Proposed Development is a statutory requirement of the EIA process. The statutory criteria for the presentation of the characteristics of potential impacts requires that potential significant impacts are described with reference to the extent, magnitude, complexity, probability, duration, frequency, reversibility and trans-frontier nature (if applicable) of the impact.

The classification of impacts in this EIAR follows the definitions provided in the Glossary of Impacts contained in the following guidance documents produced by the Environmental Protection Agency (EPA):

- *Guidelines on the Information to be contained in Environmental Impact Assessment Reports – May 2022* (EPA, 2022).
- *Advice Notes for Preparing Environmental Impact Statements – Draft September 2015* (EPA, 2015).
- *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements'* (EPA, 2003)

Table 1-2 presents the glossary of impacts as published in the EPA guidance documents. Standard definitions are provided in this glossary, which permit the evaluation and classification of the quality, significance, duration and type of impacts associated with a Proposed Development on the receiving environment. The use of pre-existing standardised terms for the classification of impacts ensures that the EIA employs a systematic approach, which can be replicated across all disciplines covered in the EIAR. The consistent application of terminology throughout the EIAR facilitates the assessment of the Proposed Development on the receiving environment.

Table 1-2 Impact Classification Terminology (EPA, 2022)

Impact Characteristic	Term	Description
Quality	Positive	A change which improves the quality of the environment
	Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
	Negative	A change which reduces the quality of the environment
Significance	Imperceptible	An effect capable of measurement but without significant consequences
	Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
	Moderate	An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends
	Significant	An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
	Very significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment
	Profound	An effect which obliterates sensitive characteristics
Extent & Context	Extent	Describe the size of the area, number of sites and the proportion of a population affected by an effect

Impact Characteristic	Term	Description
	Context	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions
Probability	Likely	Effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented
	Unlikely	Effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented
Duration and Frequency	Momentary	Effects lasting from seconds to minutes
	Brief	Effects lasting less than a day
	Temporary	Effects lasting less than a year
	Short-term	Effects lasting one to seven years
	Medium-term	Effects lasting seven to fifteen years
	Long-term	Effects lasting fifteen to sixty years
	Permanent	Effect lasting over sixty years
	Reversible	Effects that can be undone, for example through remediation or restoration
	Frequency	Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)
Type	Indirect	Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway
	Cumulative	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.
	'Do Nothing'	The environment as it would be in the future should the subject project not be carried out
	Worst Case'	The effects arising from a project in the case where mitigation measures substantially fail
	Indeterminable	When the full consequences of a change in the environment cannot be described

Impact Characteristic	Term	Description
	Irreversible	When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost
	Residual	Degree of environmental change that will occur after the proposed mitigation measures have taken effect
	Synergistic	Where the resultant effect is of greater significance than the sum of its constituents

Each impact is described in terms of its quality, significance, extent, duration and frequency, and type where possible. A 'Do-Nothing' impact is also predicted in respect of each environmental theme in the EIAR. Residual impacts are also presented following any impact for which mitigation measures are prescribed and any interactions between the impacts are assessed. The remaining impact types are presented as required or applicable throughout the EIAR.

1.8 Project Team

1.8.1 Project Team Responsibilities

The companies and staff listed in Table 1-3 were responsible for completion of the EIAR of the Proposed Development. Further details regarding project team members are provided below.

The EIAR project team comprises a multidisciplinary team of experts with extensive experience in the assessment of wind energy developments and in their relevant area of expertise. The qualifications and experience of the principal staff from each company involved in the preparation of this EIAR are summarised in Section 1.8.2 below. Each chapter of this EIAR has been prepared by a competent expert in the subject matter. Further details on project team expertise are provided in the Statement of Authority at the beginning of each impact assessment chapter.

Table 1-3 Project Team

Consultants	Principal Staff Involved in Project	EIAR Input
McCarthy Keville O' Sullivan Ltd. (MKO) Tuam Road Galway H91 VW84	Michael Watson David Naughton Lorraine Meehan Eoin O'Sullivan Thomas Blackwell Niamh McHugh Owen Cahill Meabhann Crowe Alan Clancy John Hynes Pat Roberts Sarah Mullen Kate O'Donnell Aoife Joyce	Project Management, Scoping and Consultation, Preparation of the following Report Sections: *1. Introduction* *2. Background to the Proposed Development* *3. Consideration of Reasonable Alternatives* *4. Description of the Proposed Development* *5. Population & Human Health* *6. Biodiversity and AA/NIS* *7. Ornithology* *8. Land, Soils & Geology*

Consultants	Principal Staff Involved in Project	EIAR Input
	Padraig Cregg Susan Doyle Andrew O'Donoghue Ian Hynes Jack Workman Jack Smith James Newell Joseph O'Brien	9. *Water (Hydrology and Hydrogeology)* 10. *Air & Climate* 13. *Landscape & Visual* 14. *Material Assets* 15. *Interaction of the Foregoing* 16. *Schedule of Mitigation*
Hayes McKenzie Partnership Ltd. Lintrathen House, West Dean, Salisbury, England, SP5 1JL	Robin Woodward Rob Shepherd Mike Craven	Baseline Noise Survey, Preparation of EIAR Section: 6. *Noise and Vibration*
Tobar Archaeological Services Saleen Midleton Co. Cork	Annette Quinn Miriam Carroll	Preparation of EIAR Section: 7. *Archaeological, Architectural and Cultural Heritage*

1.8.2 Project Team Members

1.8.2.1 MKO

Michael Watson – Environmental Director

Michael Watson is Project Director and head of the Environment Team in MKO. Michael has over 18 years' experience in the environmental sector. Following the completion of his Master's Degree in Environmental Resource Management, Geography, from National University of Ireland, Maynooth he worked for the Geological Survey of Ireland and then a prominent private environmental & hydrogeological consultancy prior to joining MKO in 2014. Michael's professional experience includes managing Environmental Impact Assessments, EPA License applications, hydrogeological assessments, environmental due diligence and general environmental assessment on behalf of clients in the wind farm, waste management, public sector, commercial and industrial sectors nationally. Michaels key strengths include project strategy advice for a wide range and scale of projects, project management and liaising with the relevant local authorities, Environmental Protection Agency (EPA) and statutory consultees as well as coordinating the project teams and sub-contractors. Michael is a key member of the MKO senior management team and as head of the Environment Team has responsibilities to mentor various grades of team members, foster a positive and promote continuous professional development for employees. Michael also has a Bachelor of Arts Degree in Geography and Economics from NUI Maynooth, is a Member of IEMA, a Chartered Environmentalist (CEnv) and Professional Geologist (PGeo).

David Naughton – Project Manager

David Naughton is a Project Environmental Scientist with MKO Ltd. with five years of consultancy experience. David graduated with an honours B.Sc. degree in Environmental Science from NUIG in 2016. David is experienced in report writing and has been involved in the production of several

EIS/EIARs for various renewable energy projects including onshore wind energy developments and large-scale solar energy developments. David has experience as an Environmental Clerk of Works (ECoW) including monitoring, oversight and reporting of the implementation of all planning and environmental requirements for on-site developments. David has a wide range of ecological experience including bird surveys, vegetation surveys and habitat identification. David is also very accomplished in GIS software systems for use in interpreting ecological and environmental data, including QGIS, Mapinfo and ArcGIS. David's key strengths and areas of expertise lie in report writing, project management, applications of GIS systems and SUA (drone) surveying. Since joining MKO David has been involved in a wide range of projects, acting as project manager for many onshore wind projects and other large-scale developments, providing a pivotal contact link between clients and field surveyors.

Lorraine Meehan – Senior Environmental Scientist

Lorraine Meehan is a Senior Environmental Scientist with MKO, with over 13 years of experience. Key project experience includes the project management of EIAs for renewable energy projects up to 100 Megawatts (MW) in scale, electricity infrastructure, roads, waste management facilities, and municipal services projects.

Lorraine's key strengths and responsibilities relate to the efficient and effective management of projects, including coordination of multidisciplinary project teams, engagement with the relevant authorities, stakeholders and members of the public on proposed and ongoing projects, organisation of extensive scoping and consultation exercises, and coordination and production of final project outputs, including Environmental Impact Statements / Environmental Impact Assessment Reports, Strategic Environmental Assessment (SEA) Environmental Reports, and Constraints & Feasibility and Site Selection Studies. Within MKO, Lorraine is also involved in the training of junior members of staff and review of outputs, and completes mapping, desk studies and report-writing for a range of development and strategy-related projects.

Eoin O'Sullivan – Senior Environmental Consultant

Eoin O'Sullivan is a Senior Environmental Consultant with MKO with over 12 years of experience in the assessment of a wide range of energy and infrastructure related projects and working in the fields of environmental and human health risk assessment, waste management, waste policy and permitting. Eoin has wide experience in the project management of large-scale infrastructural projects and brownfield developments which includes all aspects of geo-environmental and geotechnical investigation. Eoin holds a BSc (Hons) in Environmental Science & Technology and a MSc in Environmental Engineering. Prior to taking up his position with MKO in July 2017, Eoin worked as a Chartered Senior Engineer with CGL in Surrey, UK. Prior to this Eoin worked as a Project Engineer with RPS Consulting Engineers in Belfast. Eoin has wide experience in the project management of large-scale brownfield developments and has routinely undertaken detailed quantitative risk assessment for the protection of controlled waters and ground gas risk assessments. Eoin has also experience in completing PPC Permit Applications and in the preparation of Environmental Impact Statements/Environmental Impact Assessment Reports for renewable energy projects, quarries and a number of non-hazardous landfill sites and anaerobic digesters for both public and private clients. Other key strengths and areas of expertise include remediation options appraisals, remediation method assessments and waste management planning. Eoin is a Chartered Member of the Chartered Institute of Water and Environmental Management and Chartered Environmentalist with the Society of Environment.

Thomas Blackwell – Senior Environmental Consultant

Thomas is a Senior Environmental Consultant with over 15 years of progressive experience in environmental consulting. Thomas' professional experience includes managing Environmental Impact Assessments, environmental permitting, environmental due diligence and compliance, and general environmental assessment on behalf of clients in the renewable energy, mining, solid waste management, residential and commercial development, and public sectors. Thomas' multi-sector experience working on projects in multiple jurisdictions has allowed him to develop a wealth of knowledge and understanding of the challenges involved in guiding complex project through the regulatory and planning process.

Niamh McHugh – Graduate Environmental Scientist

Niamh is a Graduate Environmental Scientist with MKO Ltd having graduated in 2021. Niamh graduated with an honours B.Sc. degree in Environmental Science from NUI, Galway in 2021. Niamh is experienced in report writing and has been involved in the production of EIARs and SEAs for various projects including Watercourse Maintenance Programmes and Onshore Wind Energy developments. Niamh has carried out a wide range of ecological surveying work through her college education, including small mammal surveys, bat surveys and freshwater invertebrate surveys. Niamh also has considerable experience using QGIS mapping software for a wide variety of projects. Niamh's key strengths lie in the areas of report writing and communication, applications of GIS mapping software. Since joining MKO Niamh has been involved in a wide range of projects, acting as a graduate environmental scientist.

Owen Cahill – Environmental Engineer / Health & Safety Manager

Owen is an Environmental Engineer with over 12 years of experience in the environmental management and construction industries. Owen is also the MKO Health & Safety Officer with the responsibility for managing Occupational Safety and Health matters in the Galway Office. Owen holds BSc. (Hons) and MSc. in Construction Management and a Master's in environmental engineering. Owen has also successfully completed a Managing Safely Course approved and validated by the Institution of Occupational Safety and Health. Prior to taking up his position with McCarthy Keville O'Sullivan in October 2013, Owen worked as an Environmental Officer with Kepak and prior to which he held a post with Pentland Macdonald Contaminated Land & Water Specialist in Northern Ireland. Prior to working in planning and environmental consultancy, Owen was employed within the construction industry where he gained significant experience on a variety of civil, residential and commercial projects. Owen's wide ranging multi sector experience has provided him with specialist knowledge and understanding of the challenges in the planning and delivery of developments with the minimum environmental impact and with practicality and constructability in mind.

Owen's key strengths and areas of expertise are in project management, environmental impact assessment, wind energy & solar energy construction & environmental management planning and waste permit management. Since joining MKO Owen has been involved as a Project Manager on a range of energy infrastructure, commercial, residential, waste facility and quarry projects as well as managing the licensing requirements of a number of EPA licensed facilities. Within MKO Owen plays a large role in the management and confidence building of junior members of staff and works as part of a large multi-disciplinary team to produce EIS Reports. Owen is Full Member and Chartered Environmentalist with the Institute of Environmental Management & Assessment.

Meabhann Crowe – Project Planner

Meabhann Crowe is a Project Planner with McCarthy O'Sullivan Ltd with over 13 years private sector experience. She is a fully chartered member of the Royal Town Planning Institute (MRTPI). Meabhann holds a BA (Hons) in Geography, Sociological and Political Science and a Masters in Urban and Regional Planning. Prior to taking up her position with McCarthy Keville O'Sullivan in October 2018, Meabhann was employed as an Associate Director with Colliers International in their Edinburgh office, prior to which she was employed for several years with Halliday Fraser Munro. In her time in the industry Meabhann has been active on a number of instructions across a broad spectrum of mixed-use, residential, commercial, renewable energy and retail projects.

Meabhann brings particular expertise in initial development feasibility appraisals and development strategies. Her experience in managing large multi-disciplinary teams in the preparation of local and major planning applications across residential, mixed-use and retail developments means she has a wealth of knowledge to draw on in the early stages of development. She has particular experience in preparing and managing site strategies which include both responding to emerging planning policy whilst also preparing and progressing planning applications and appeals.

Alan Clancy – Planner

Alan Clancy is a Planner with MKO with over 5 years of experience in private practice. Alan holds a BA in Geography & History and Masters in Planning and Sustainable Development. Prior to taking up his position with MKO in February 2021, Alan worked as a Planner for Indigo Telecom Group in Limerick Ireland where he assisted with management of all planning aspects of new telecommunications network roll out programmes, retentions of existing sites and all aspects of dealing with planning applications and appeals for leading telecommunications operators. Prior to this, Alan worked in the UK with the JTS Partnership LLP, where he gained experience as a graduate planner through to planner level. Alan has experience across a range of sectors including commercial, residential and industrial, as well as having experience with providing development advice and undertaking background research for clients, preparing planning applications of varying sizes as well as planning appeals and conditions compliance and managing all aspects of the planning process for commercial, educational and Infrastructural projects. Alan's key strengths and areas of expertise are in development management, provision of planning advice and project management of small and medium sized projects. Since joining MKO, Alan has worked on a various range of projects including Strategic Infrastructure Developments, lodgement and management of Planning Applications, Development Plan Submissions and preparing Development Potential Reports. Alan is currently working towards chartered membership of the Irish Planning Institute.

John Hynes – Ecology Director

John Hynes is a Senior Ecologist and director of the Ecology team with McCarthy O'Sullivan Ltd. with over 9 years of experience in both private practice and local authorities. John holds a B.SC in Environmental Science and a M.Sc. in Applied Ecology. Prior to taking up his position with McCarthy Keville O'Sullivan in March 2014, John worked as an Ecologist with Ryan Hanley Consulting Ltd. and Galway County Council. John has specialist knowledge in Flora and Fauna field surveys. Geographic Information Systems, data analysis, Appropriate Assessment, Ecological Impact Assessment and Environmental Impact Assessment. John's key strengths and areas of expertise are in project management. GIS and impact assessment. Since joining MKO John has been involved as a Senior Ecologist on a significant range of energy infrastructure, commercial, national roads and private/public development projects. Within MKO John plays a large role in the management and confidence building of junior members of staff and works as part of a large multi-disciplinary team to produce EIS Reports. John has project managed a range of strategy and development projects across the Ireland and holds CIEEM membership.

Pat Roberts – Principal Ecologist

Pat Roberts is a Principal Ecologist with McCarthy O'Sullivan Ltd. with over 14 years post graduate experience of providing ecological services in relation to a wide range of developments at the planning, construction and monitoring stages. Pat holds B.Sc.(Hons) in Environmental Science. Pat has extensive experience of providing ecological consultancy on large scale industrial and civil engineering projects. He is highly experienced in the completion of ecological baseline surveys and impact assessment at the planning stage. He has worked closely with construction personnel at the set-up stage of numerous construction sites to implement and monitor any prescribed best practice measures. He has designed numerous Environmental Operating Plans and prepared many environmental method statements in close conjunction with project teams and contractors. He has worked extensively on the identification, control and management of invasive species on numerous construction sites. Prior to taking up his position with MKO in June 2005, Pat worked in Ireland, USA and UK as a Tree Surgeon and as a nature conservation warden with the National Trust (UK) and the US National Park Service. Pats key strengths include his depth of knowledge and experience of a wide range of ecological and biodiversity topics and also in his ability to understand the requirements of the client in a wide range of situations. He is a full member of the Chartered Institute of Ecologists and Environmental Managers (CIEEM).

Sarah Mullen – Project Ecologist

Sarah is a Project Ecologist with MKO with over 5 years of experience in ecological consultancy. Sarah holds a B.Sc. (Hons) in Botany, an M.Sc. in Biodiversity and Conservation and a Ph.D. in Botany, in which she investigated the role of biodiversity in the functioning of plant-pollinator interactions in semi-natural grassland habitats. Prior to taking up her position with MKO in September 2018, Sarah worked as an Ecologist with Ryan Hanley Ltd. where she gained experience in multidisciplinary ecological surveys, ecological impact assessment and appropriate assessment. Since joining MKO Sarah has been responsible for the management and undertaking of flora, fauna and habitat surveys for a range of projects including energy infrastructure and public and private residential developments and for the preparation of Ecological Impact Assessments, Stage 1 and Stage 2 Appropriate Assessment reports and Biodiversity/Habitat Management Plans. Sarah's key strengths and areas of expertise are in terrestrial flora and fauna ecology, including vegetation surveys, habitat mapping, invasive species surveys, mammal surveys, Appropriate Assessment and Ecological Impact Assessment. She holds membership with the Chartered Institute of Ecology and Environmental Management.

Kate O'Donnell – Ecologist

Kate is an Ecologist with MKO with over 3 years of experience in ecological consultancy. Kate holds a BSc (Hons) in Ecology and Environmental Biology. Kate's key strengths and areas of expertise are in terrestrial ecology, including vegetation surveys, habitat identification, invasive species surveys, mammal surveys, Appropriate Assessment and Ecological Impact Assessment. Kate is also skilled in GIS. Prior to taking up her position with MKO in February 2022, Kate worked as an Ecologist with RPS where she gained experience in Ecological Impact Assessment, Appropriate Assessment and multidisciplinary ecological surveys for a range of projects including IDA developments, flood relief schemes, road network improvements and greenway developments. Since joining MKO Kate has been responsible for organising and undertaking flora, fauna and habitat surveys in accordance with NRA Guidelines for projects including wind farm developments and housing developments and for the preparation of Ecological Impact Assessments and Stage 1 and Stage 2 Appropriate Assessment reports. She holds membership with the Chartered Institute of Ecology and Environmental Management.

Aoife Joyce – Project Ecologist

Aoife Joyce is a Project Ecologist with MKO Planning and Environmental Consultants with experience in research, consultancy and drilling contractors. Aoife is a graduate of Environmental Science (Hons.) at NUI Galway, complemented by a first-class honours MSc in Agribioscience. Prior to taking up her position with MKO in May, 2019, Aoife worked as an Environmental Scientist with Irish Drilling Ltd. and held previous posts with Inland Fisheries Ireland and Treemetrics Ltd. She has a wide range of experience from bat roost identification, acoustic sampling, sound analysis, soil and water sampling, Waste Acceptability Criteria testing, electrofishing, mammal and habitat surveying to GIS, Environmental Impact Assessments (EIAs) and mapping techniques. Since joining MKO, Aoife has been involved in managing bat survey requirements for a variety of wind farm planning applications, as well as commercial, residential and infrastructure projects. This includes scope development, roost assessments, deploying static bat detectors and weather stations nationwide, dawn and dusk bat detection surveys, sonogram analysis, mapping, impact assessment, mitigation and report writing. Within MKO, she works as part of a multidisciplinary team to help in the production of ecological reports and assessments. Aoife is a member of Bat Conservation Ireland and CIEEM and holds a current Bat Roost Disturbance licence.

Padraig Cregg – Senior Ornithologist

Padraig Cregg is a Senior Ornithologist with McCarthy O'Sullivan Ltd. with over 10 years of experience in both private practice and NGOs. Padraig holds a BSc (Hons) in Zoology and Masters in Evolutionary and Behavioural Ecology. Prior to taking up his position with MKO in December 2018, Padraig worked as a Senior Ornithologist and held previous posts with TOBIN Consulting Engineers, Energised Environments Ltd in Scotland, WSP Environment and Energy Ltd in Scotland and BirdWatch Ireland. Padraig has specialist knowledge in designing, executing and project managing ornithological assessments, primarily in the renewable industry. Padraig's key strengths and areas of expertise are in ornithology and ecology surveying and in writing Natura Impact Statements (NIS) and the Biodiversity chapter of EIA Reports to accompany planning applications. Since joining MKO Padraig has been involved in designing, executing and project managing the ornithological assessment on over 20 proposed wind farm developments. He has played a key role in project managing these planning applications through the statutory planning system, with more projects in the pipeline. Within MKO Padraig plays a large role in the management and confidence building of junior members of staff and works as part of a large multi-disciplinary team to produce EIAR and NIS Reports.

Susan Doyle – Project Ornithologist

Susan Doyle is a project ornithologist at MKO. She completed her primary degree in Zoology (moderatorship in Natural Science) at Trinity College Dublin in 2013 and her master's degree in Ecological Assessment in University College Cork in 2014. Susan has five years' experience in ecological consultancy and has worked on wind farm projects, solar farm projects, residential developments, data centres, county council projects and National Parks and Wildlife Service projects. She specialises in ornithological consulting, including Environmental Impact Assessments, Natura Impact Statements and Appropriate Assessments. Prior to joining MKO in October 2020, Susan gained experience through her involvement in several bird conservation projects, including protected curlew, seabirds, waders and waterfowl, as well as research into breeding hen harrier, satellite telemetry in migrant birds and avian diseases in Ireland, providing her with extensive experience in a wide variety of bird survey methods, data management and reporting.

Andrew O'Donoghue – Project Ornithologist

Andrew O'Donoghue is a Project Ornithologist with McCarthy O'Sullivan Ltd. Andrew holds BSc (Hons) in Zoology from University College Dublin. Before taking up his position with McCarthy Keville O'Sullivan in January 2017, Andrew worked as a sub-contract bird surveyor for Scott Cawley Ltd. Prior to this he completed a field biologist internship with the University of Saskatchewan in Canada and worked with Birdwatch Ireland as a Warden on a Seabird conservation project. Andrew's key strengths and areas of expertise are in bird surveying techniques, knowledge of species ecology and identification, GIS and data management. Since joining MKO Andrew has been involved as an ornithologist on several proposed windfarm sites across Ireland and is currently responsible for the project management and implementation of a range of survey types on several major wind developments across the northwest.

Ian Hynes – Ecologist

Ian Hynes is an Ecologist with McCarthy Keville and O'Sullivan Ltd., joining in December of 2017. Ian holds a B.Sc. (Hons) in Environmental Science from National University of Ireland, Galway. Ian has a broad knowledge of ecology including invertebrate surveys and identification, vegetation surveys, small mammal surveys and habitat identification. Ian also has over 2 years of experience using GIS software systems including ArcGIS and QGIS and MapInfo to present ecological data.

As part of his final year thesis Ian gained valuable experience in report writing, data input, invertebrate and plant identification. Ian also liaised with members of the AranLIFE project and local landowners on Inis Oirr, Aran Islands in the summer of 2016 while completing his thesis.

Ian's key strengths are in Data management and GIS/MapInfo software. Since joining the Ornithology team at McCarthy Keville & O'Sullivan Ltd. He has been involved in a number of windfarm projects, utilizing his skills to compile data and create maps for surveys and figures.

Jack Workman – Environmental Scientist and LVIA Specialist

Jack Workman is an Environmental Scientist and Landscape and Visual Impact Assessment Specialist with MKO. Jack's primary role at MKO is within the landscape team where he produces the Landscape Visual Impact Assessment (LVIA) chapter of Environmental Impact Assessment reports. Jack holds a BSc. In Psychology, an MSc. in Coastal and Marine Environments (Physical Processes, Policy & Practice) where he was awarded the Prof. Máirín De Valéra distinction in science research award. Prior to taking up his position with MKO, Jack worked as a Geospatial Analyst and Research Assistant with NUIG and also held previous posts in the coastal engineering sector with Royal Haskoning DHV and Saltwater Technologies. Since joining MKO in February 2020, Jack has conducted and project managed all aspects of LVIA for a broad range of commercial infrastructure developments including wind and solar energy projects, grid infrastructure, extraction industry and Strategic Housing Developments. Jack has utilised his specialist knowledge in LVIA to deliver effective consultation during the early-stage design of large infrastructure developments as well as conducting Landscape Capacity Assessments and feasibility studies. Jack holds a membership with the Chartered Institute of Water and Environmental Management, he is an Affiliate member with the British Landscape Institute and is also an active member of the Landscape Research Group.

James Newell – Graphics Technician

James Newell is a Graphics Technician with McCarthy O'Sullivan Ltd. with over 20 years of experience in private practice. James holds a City and Guilds CAD Certificate in 2D and 3D. Prior to taking up his position with McCarthy Keville O'Sullivan in May 2006, James worked as a pre-press graphic designer with Clodoiri Lurgan Teo. Inverin, Co. Galway. James is a highly creative individual with proficient in numerous graphic & GIS applications. James's key strengths are in photomontage development for the wind & solar energy sector and design production of reports illustrating their visual impacts. Since joining MKO James has contributed to EIS reports in the areas of Wind & Solar farm site drawing design, photomontage, ZTV mapping & shadow flicker analysis. Within MKO James works as part of a shared resources team supporting a variety teams with varied skillsets in addition to managing the KOS's Information technology (I.T.) needs, such as computer & software training &maintenance, virus threats & daily Backups.

Joseph O'Brien – CAD Technician

Joseph O'Brien holds the position of CAD Technician. Joseph holds a BA Honours Level 8 Modelmaking, Design and Digital Effect, Institute of Art Design and Technology (IADT), Dun Laoghaire & City & Guilds Level 3 2D &3D AutoCAD certificates. Joseph's role entails various wind and solar farm projects which require various skills such as mapping, aerial registration and detailed design drawings for projects. Prior to joining us, Joseph worked as a free-lance Modelmaker and CAD Technician. His previous experience included designing various models and props through CAD and then making them for various conventions such as Dublin Comic Con and Arcade Con.

1.8.2.2 Hayes McKenzie Partnership Ltd.

Robin Woodward – Senior Consultant (BSc, MIOA)

Robin Woodward is a senior consultant working remotely from North Wales. He joined the company in 2010 after graduating from the Institute of Sound and Vibration Research at the University of Southampton, with a BSc Hons in Acoustical Engineering and Music. He spent 8 years working in the Salisbury Office and has spent the last 2 years working remotely from North Wales, with regular visits to the Machynlleth Office.

Since joining Hayes McKenzie, Robin has had a driving influence on improving quality and consistency within the company, culminating in his key role in gaining Hayes McKenzie an accreditation from UKAS for our wind turbine testing activities, for which he is the quality manager and head of department. He also serves on the British Standards shadow committee and international IEC committee (TC88, MT11) responsible for the UK input to IEC 61400-11, as well at the project team (PT11-2) developing a new standard for receptor distance measurements and analysis of wind turbine noise, for which he heads up the chapter on Amplitude Modulation and contributes to the standard as a whole. He is also on Institute of Acoustics' Meetings Committee, where he is responsible for drafting guidance for virtual meetings.

Rob Shepherd – Associate (M.Eng, MIOA)

Rob Shepherd is an acoustic consultant and associate at the Hayes McKenzie partnership, and deputy manager of the Salisbury office. He graduated from the University of Southampton in 2005 with a Master of Engineering degree in Acoustical Engineering from the Institute of Sound and Vibration Research. Rob has worked in the field of acoustical engineering for over 15 years, specialising in the field of noise from on-shore wind farms involving work on over 350 wind farm projects, and has appeared as an expert witness in the UK and Ireland.

In addition to work on wind farm projects, Rob regularly carries out assessments for other projects including assessing noise impacts using BS 4142 Methods for rating and assessing industrial and commercial sound, and assessing construction impacts using BS 5288 Code of practice for noise and vibration control on construction and open sites.

Rob is responsible for handling all aspects of project management including preparing quotations, carrying out noise modelling, data analysis, assessment, and reporting. As well as managing his own portfolio of projects, Rob carries out technical reviews of other consultants' analysis and reports, to ensure that all work is carried out to our high standards.

Mike Craven – Principal Acoustic Consultant (BSc, MIOA)

Mike Craven is a principal consultant at the Salisbury office. He originally joined us in 2004, after completing a degree in Audio Technology at Salford University, working in the Machynlleth office for three years.

In 2008 he joined URS, where he provided support to the Environmental Impact Assessment team on noise and vibration issues for a diverse range of projects, including large residential, commercial and industrial developments; oil and gas infrastructure; and construction. The role also included advancing the company objective of expanding EIA-related services and providing advice on wind turbine noise, as part of the trial Renewable Energy and Planning Expert Support Network. He re-joined our company in October 2011.

1.8.2.3 Tobar Archaeological Services

Tobar Archaeological Services is a Cork-based company in its 16th year in business. They offer professional nationwide services ranging from pre-planning assessments to archaeological excavation, and cater for clients in state agencies, private and public sectors.

Tobar's Directors, Annette Quinn and Miriam Carroll, are licensed by the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs to carry out excavations in Ireland and have carried out work directly for the National Monuments Services of the Department of the Environment, Heritage and Local Government. Tobar Archaeological Services has a proven track record and extensive experience in the wind farm industry from EIS/EIAR stage through to construction stage when archaeological monitoring is frequently required.

1.9 Difficulties Encountered

There were no technical difficulties encountered during the preparation of this EIAR.

1.10 Viewing and Purchasing of the EIAR

Copies of this EIAR including the Non-Technical Summary (NTS), will be available online, via the dedicated Dunneill Wind Farm project website; https://www.sserenewables.com/onshore-wind/ireland/dunneill.

This EIAR and all associated planning documentation will also be available for viewing at the offices of Sligo County Council. The EIAR may be inspected free of charge or purchased by any member of the public during normal office hours at the following address:

Sligo County Council
Planning Department
County Hall
Riverside
Sligo
F91 Y763

The EIAR will also be available to view online via the Department of Planning, Housing and Local Government's EIA Portal, which will provide a link to the planning authority's website on which the application details are contained. This EIA Portal was recently set up by the Department as an electronic notification to the public of requests for development consent which are accompanied by an EIAR (https://www.housing.gov.ie/planning/environmental-assessment/environmental-impact-assessment-eia/eia-portal).

2. BACKGROUND TO THE PROPOSED DEVELOPMENT

This section of the Environmental Impact Assessment Report (EIAR) presents information on renewable energy and climate change policy and targets, the strategic, regional and local planning context for the Proposed Development, planning history, scoping and consultation, as well as setting out the nature of the cumulative impact assessment process undertaken.

2.1 Introduction

The details below set out the need for the Proposed Development to aid Ireland in meeting its national targets and European commitments in relation to climate change and decarbonisation.

The Proposed Development seeks to achieve planning permission to extend the operational life of the existing Dunneill Wind Farm and all associated infrastructure (Pl. Ref. 03/619 & ABP Pl. Ref. 21.204790) in the three townlands of Crowagh or Dunneill Mountain, Tawnadremira, and Ballyglass.

The existing wind farm consists of 13 No. Vestas V52 850-kilowatt (kW) turbines with a blade tip height of 75m (49m tower, 52m rotor diameter). The existing wind farm, which became operational in 2010, has a total rated capacity of c.11 Megawatts (MW).

The need to decarbonise the economy and reduce emissions has always been imperative, however in recent years the urgency involved has become clearer to all stakeholders. The Climate Action Plan 2021 (CAP21) published by the Government on the 4th of November 2021 has clearly identified the urgent requirement for combatting climate change and for the immediate reduction in greenhouse gasses.

The CAP21 sets a sectoral roadmap which aims to deliver a 51% reduction in greenhouse gas (GHG) emissions by 2030 and net-zero emissions by no later than 2050. *"The Plan lists the actions needed to deliver on our climate targets and will be updated annually, including in 2022, to ensure alignment with our legally binding economy-wide carbon budgets and sectoral ceilings."*

The site of the Proposed Development is currently an operational wind farm which has been supplying renewable energy to the national electricity grid since being commissioned in 2010. The existing wind farm has been contributing to Ireland's energy and climate targets over the past approximately 12 years.

Planning permission is being sought from Sligo County Council (SCC) to enable the existing wind farm to continue operating in its current form for an additional 15 years. The primary driver behind extending the operational period of the wind farm is the need to provide additional renewable energy to the national grid from a proven source and appropriate site, to offset the use of fossil fuels within the electricity generating sector.

This review of relevant policy contained in this Section of the EIAR concludes that the Proposed Development is consistent with the overarching planning framework with regard to facilitating the move away from dependency on fossil fuels and the promotion of proper planning and sustainable development.

2.1.1 Climate Change Policy Targets

International and national policy consistently identifies the need to reduce greenhouse gas (GHG) emissions and stresses the importance of reducing global warming. The context of international policy has altered over the last 30-years from being of a warning nature to the current, almost universally accepted belief, that there is a climate change emergency occurring both within Ireland and at a broader global scale. The Intergovernmental Panel on Climate Change (IPCC)'s Sixth Assessment Report[1] published in 2021 provides a stark assessment of global climate change and presents evidence that climate changes will increase in all regions of the globe over the coming decades and that much of the damage caused by climate change up to this point is now likely irreversible, such as the rise in sea levels over the 21st century. The Climate Status Report for Ireland 2020[2] similarly reflects on clear and distinct impacts arising from climate change effects within an Irish context:

- An increase in the number of warm spell days the last 60 years with very little change in cold spell duration;
- Annual precipitation was 6% higher in the period 1989–2018, compared with the 30-year period 1961–1990, and the decade 2006–2015 has been the wettest on record;
- Satellite observations indicate that the sea level around Ireland has risen by approximately 2–3mm per year since the early 1990s; and
- In 2018, carbon dioxide emissions were almost 18% higher than in 1990, primarily due to increased fossil fuel combustion in transport and energy industries

The IPCC's Sixth Assessment Report does not, however, conclude that a climate catastrophe is inevitable, but rather, there remains a 'narrow path' to determine the future course of climate, mainly by cutting emissions down to net zero. The Proposed Development will contribute to the decarbonisation of the energy sector and reduce harmful emissions. In this regard, it is in compliance with national and international climate change policy and targets.

2.1.1.1 International Policy and Targets

In 1992, countries joined an international treaty, the United Nations Framework Convention on Climate Change (UNFCCC), as a framework for international efforts to combat the challenge posed by climate change. The UNFCCC seeks to limit average global temperature increases and the resulting climate change. In addition, the UNFCCC seeks to cope with impacts that are already inevitable. It recognises that the climate system is a shared resource whose stability can be affected by industrial and other emissions of carbon dioxide and other greenhouse gases. The framework set no binding limits on greenhouse gas emissions for individual countries and contains no enforcement mechanisms. Instead, the framework outlines how specific international treaties (called "protocols" or "Agreements") may be negotiated to set binding limits on greenhouse gases.

Kyoto Protocol

The Kyoto Protocol operationalises the UNFCCC by committing industrialised countries and economies in transition to limit and reduce GHG emissions in accordance with agreed individual targets. Ireland is a Party to the Kyoto Protocol, which came into effect in 2005, and as a result of which, emission reduction targets agreed by developed countries are now binding.

In Doha, Qatar, on 8th December 2012, the *"Doha Amendment to the Kyoto Protocol"* was adopted. The amendment includes:

- New commitments for Annex I Parties to the Kyoto Protocol who agreed to take on commitments in a second commitment period from 1st January 2013 to 31st December 2020;
- A revised list of greenhouse gases (GHG) to be reported on by Parties in the second commitment period; and
- Amendments to several articles of the Kyoto Protocol which specifically referenced issues pertaining to the first commitment period and which needed to be updated for the second commitment period.

[1] *Climate Change 2021 'The Physical Science Basis' (Intergovernmental Panel on Climate Change, August 2021)*
[2] *Climate Status Report for Ireland 2020 (Environmental Protection Agency, Marine Institute, Met Éireann, August 2021)*

Under the protocol, countries must meet their targets primarily through national measures, although market-based mechanisms (such as international emissions trading) can also be utilised.

COP21 Paris Agreement

COP21 was the 21st session of the Conference of the Parties (COP) to the UNFCCC. Every year since 1995 (excluding 2020 due to COVID-19), the COP has gathered the 196 Parties (195 countries and the European Union) that have ratified the Convention in a different country, to evaluate its implementation and negotiate new commitments. COP21 was organised by the United Nations in Paris and held from 30th November to 12th December 2015. COP21 closed with the adoption of the first international climate agreement (concluded by 195 countries and applicable to all). The 12-page text, made up of a preamble and 29 articles, provides for a limitation of the global average temperature rise to well below 2°C above pre-industrial levels and **to limit the increase to 1.5°C**. It is flexible and takes into account the needs and capacities of each country. The IPCC's 6th Assessment Report (2021) further collaborates this need to limit any increase in global average temperature to 1.5°C, stating that (underlined for emphasis),

> *"Humanity has emitted 2,560 billion equivalent tons of CO_2 since 1750, and we only have a budget of 500 more if we want to limit warming to 1.5°C.*
>
> *By following a trajectory of very low GHG emissions (SSP1-1.9), the threshold of 1.5°C will be reached in the short term, between 2021 and 2040, before being very slightly exceeded (1.6°C anticipated over the period 2041-2060) then respected in the long term (1.4°C anticipated over the period 2081-2100).*
>
> *Everything is not lost, but we must pursue the Paris Agreement's most ambitious goal of limiting warming to 1.5°C."*

An article published by the IPCC on the 6th October 2018 titled '*Global Warming of 1.5°C*', notes the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways; in the context of mitigation pathways, strengthening of the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. This special report is part of an invitation contained in the Decision of the 21st Conference of Parties of the United Nations Framework Convention on Climate Change to adopt the Paris Agreement, and provides an update on the impact of climate change if emissions are not reduced.

COP25 Madrid

COP25, the 25th session of the COP, was held between the 2nd and 13th of December 2019 in Madrid. The conference was characterised by repeated warnings from civil society (NGOs and corporates) on emerging evidence and scientific consensus on climate change risk. Specifically, it was noted that there are only c. '*10 years left*' before the opportunity of limiting global warming to 1.5°C is no long feasible. As such, the only remaining approach to limiting raising global temperatures is a '*7.6% reduction of global GHG emissions every year between 2020 and 2030, and to reach net zero emissions by 2050*'. However, consensus was not achieved between States on finalising the operating rules of the Paris Agreement and to ensure that it became operational by 2020. Three issues which emerged between States from the COP25 are summarised below:

- There was no uniform consensus between States to raise countries' climate ambitions, e.g. to make increased commitments in light of growing climate change data. Some States were opposed to imposing any obligation on countries to submit enhanced pledges next year, arguing it should be each country's own decision. All states were required to submit a review of their commitments for COP 26 in 2020. At the current level of climate targets, within a decade, the objective of the Paris Agreement will no longer be achievable;

- There was no agreement on finalising Article 6, the foundations for international cooperation to combat climate change. The aim was to establish the rules for new international mechanisms for financing and transferring GHG emission reductions; and
- There was no agreement on financing (Green Climate Fund); specifically, relating to both loss and damage caused by climate change.

Despite the lack of consensus on the above challenges, the COP25 did achieve more limited success with regard to the introduction of the "*San Jose Principles for High Ambition and Integrity of International Carbon Markets*", which sets out the framework on which a robust carbon market should be built. These principles include, but are not limited to:

- Ensures environmental integrity and enables the highest possible mitigation ambition;
- Delivers an overall mitigation in global emissions, moving beyond zero-sum offsetting approaches to help accelerate the reduction of global greenhouse gas emissions;
- Prohibits the use of pre-2020 units, Kyoto units and allowances, and any underlying reductions toward Paris Agreement and other international goals; and
- Ensures that double counting is avoided and that all use of markets toward international climate goals is subject to corresponding adjustments.

These principles were supported by 23 EU, including Ireland, and Latin American countries, 5 no. pacific islands and 2 no. countries in the Caribbean.

COP26 Glasgow

COP26 took place in Glasgow, Scotland between the 31st October and 12th November 2021. The summit was centred around the fact that "*climate change is the greatest risk facing us all.*" The UK, as hosts for the summit, have developed a ten point plan to deliver a green industrial revolution, seeking to lead the world in tackling and adapting to climate change.

The key items COP26 seeks to achieve are:

- Secure global net zero by mid-century and keep 1.5 degrees within reach
- Adapt to protect communities and natural habitats
- Mobilise finance
- Work together to deliver

All world leaders at the summit confirmed the need to urgently address the gaps in ambition and work together to achieve climate action.

The summit highlighted that the Paris Agreement is working, with leaders outlining national targets and efforts to further reduce emissions. There was a clear commitment to working together to achieve climate aims, with significant announcements including:

- *"Over 40 leaders joined the Breakthrough Agenda, a 10-year plan to work together to create green jobs and growth globally, making clean technologies and solutions the most affordable, accessible and attractive option before 2030 – beginning with power, road transport, steel, hydrogen and agriculture.*
- *Over 120 countries covering more than 90% of the world's forests endorsed the Glasgow Leaders' Declaration on Forests & Land Use committing to work collectively to halt and reverse forest loss and land degradation by 2030, backed by the biggest ever commitment of public funds for forest conservation and a global roadmap to make 75% of forest commodity supply chains sustainable.*
- *A Just Energy Transition Partnership was announced to support South Africa's decarbonisation efforts; a powerful example of collaboration between an emerging economy and international partners.*

- *The launch of the Global Methane Pledge saw over 100 countries committing collectively to reduce global methane emissions by 30% by 2030."*

European Green Deal – European Climate Law (2021)

The European Green Deal, initially introduced by the European Commission in December 2019, sets out the 'blueprint' for a transformational change of the 27-country bloc from a high- to a low-carbon economy, without reducing prosperity and while improving people's quality of life, through cleaner air and water, better health and a thriving natural world. The Green Deal is intended to work through a framework of regulation and legislation setting clear overarching targets, e.g. **a bloc-wide goal of net zero carbon emissions by 2050 and a 55% cut in emissions by 2030 (compared with 1990 levels)**. This is a substantial increase compared to the existing target, upwards from the previous target of at least 40% (2030 Climate & Energy Framework), and furthermore, these targets demonstrate the ambition necessary to keep the global temperature increase to well below 2°C and pursue efforts to keep it to 1.5°C as per the Paris Agreement. With regard to the energy sector, the Green Deal focuses on 3 no. key principles for the clean energy transition, which will help reduce greenhouse gas emissions and enhance the quality of life for citizens:

- Ensuring a secure and affordable EU energy supply;
- Developing a fully integrated, interconnected and digitalised EU energy market; and
- Prioritising energy efficiency, improving the energy performance of our buildings and developing a power sector based largely on renewable sources (e.g. the subject development)

The European Climate Law[3] writes into law the objectives set out above in the European Green Deal for Europe's economy and society to become climate-neutral by 2050. Climate neutrality by 2050 means achieving net zero greenhouse gas emissions for EU countries as a whole, mainly by cutting emissions, investing in green technologies and protecting the natural environment. The Climate Law includes:

- A legal objective for the Union to reach climate neutrality by 2050;
- An ambitious 2030 climate target of at least 55% reduction of net emissions of greenhouse gases as compared to 1990, with clarity on the contribution of emission reductions and removals;
- A process for setting a 2040 climate target, taking into account an indicative greenhouse gas budget for 2030-2050 to be published by the Commission;
- A commitment to negative emissions after 2050;
- The establishment of European Scientific Advisory Board on Climate Change, that will provide independent scientific advice;
- Stronger provisions on adaptation to climate change; and
- Strong coherence across Union policies with the climate neutrality objective

The law aims to ensure that all EU policies contribute to this goal and that all sectors of the economy and society play their part. All 27 no. EU Member States have committed to turning the EU into the first climate neutral continent by 2050. One third of the 1.8 trillion-euro investments from the NextGenerationEU Recovery Plan, and the EU's seven-year budget, will finance the European Green Deal. On 14th July 2021, the European Commission adopted a set of proposals[4] to make the EU's climate, energy, transport and taxation policies fit for reducing net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels. Achieving these emission reductions in the next decade which is crucial to Europe becoming the world's first climate-neutral continent by 2050 would clearly be assisted by the Proposed Development.

[3] *European Climate Law was published in the Official Journal on 9 July 2021 and came into force on 29 July 2021.*
[4] *'Fit for 55': delivering the EU's 2030 Climate Target on the way to climate neutrality (July 2021)*

REPowerEU (2022)

In response to the Russia's military aggression against Ukraine, the EU decided to rapidly reduce its dependency on Russian fossil fuels through the REPowerEU plan. The plan put forward a set of actions to achieve the following:

- Save energy.
- Diversify supplies.
- Quickly substitute fossil fuels by accelerating Europe's clean energy transition.
- Smartly combine investments and reforms.

In order to substitute fossil fuels for clean, renewable energy, the EU acknowledges that a 'massive speed-up and scale-up' in the renewable energy sector. The plan seeks to increase the renewable energy generation target set out in the Renewable Energy Directive from 40% to 45% by 2030, bringing the EU's total renewable energy generation target to 1236 GW in comparison to 1067 GW. The need to further strengthen the EU's wind energy sector has been identified in order to achieve the ambitions of the REPowerEU plan. Accelerating the permitting process along with strengthening supply chains are highlighted as key areas for improvements. Ireland has one of the strongest onshore wind energy resources in the EU (Annex 2 – maps) and therefore has a significant role to play in meeting the plan's ambitions. Wind energy developments, such as the Proposed Development, enhance Irish and EU energy security, enabling the EU to reduce its reliance on Russian fossil fuels.

2.1.1.2 National Policy

Programme for Government (2020)

The Programme for Government 2020 (June 2020) places specific emphasis on climate change, stating that the next ten years are a critical period in addressing the climate crisis, and therefore, a deliberate and swift approach to reducing more than half of Ireland's carbon emissions over the course of the decade (2020-2030) must be implemented. The programme states that the government are committed to reducing greenhouse gas emissions by an average 7% per annum over the next decade in a push to achieve a net zero emissions by the year 2050.

With regard to energy generation, the Programme notes that the government is committed to the rapid decarbonisation of the energy sector. The Programme states the government's ongoing support and commitment to take "*the necessary action to deliver at least 70% renewable electricity by 2030."* While it is noted this has been updated by the 2021 Climate Action Plan, the Programme for Government sets out a range of measures to achieve this target which remain relevant, including:

- Finalise and publish the Wind Energy Guidelines
- Continue Eirgrid's programme 'Delivering a Secure, Sustainable Electricity System'
- Strengthen the policy framework to incentivise electricity storage and interconnection
- Produce a whole-of-government plan setting out how we will deliver at least 70% renewable electricity by 2030.

The Climate Action and Low Carbon Development (Amendment) Act (2021)

The Climate Action and Low Carbon Development (Amendment) Act 2021, which was signed into law on the 23rd July 2021, legally binds Ireland to achieve net-Zero emissions no later than 2050, and to a 51% reduction in emissions by the end of this decade. The Act provides the framework for Ireland to meet its international and EU climate commitments and to become a leader in addressing climate change. As indicated by the premise of the legislation, the reduction of emissions is a key proponent of the Climate Action and Low Carbon Development (Amendment) Act 2021 and incorporates the following key provisions:

- Embeds the process of setting binding and ambitious emissions-reductions targets in law;
- Provides for a national climate objective, which commits to pursue and achieve no later than 2050, the transition to a climate resilient, biodiversity-rich, environmentally sustainable and climate-neutral economy;
- Provides that the first two five-year carbon budgets proposed by the Climate Change Advisory Council should equate to a total reduction of 51% over the period to 2030, relative to a baseline of 2018;
- The role of the Climate Change Advisory Council has been strengthened;
- The government must adopt carbon budgets that are consistent with the Paris agreement and other international obligations;
- Actions for each sector will be detailed in the Climate Action Plan which must be updated annually; and
- Local Authorities must prepare individual Climate Action Plans which will include both mitigation and adaptation measures and will be updated every five years.

The project represents a significant opportunity be a nationally important wind energy generator, contributing to the 51% reduction in emissions being sought, which is as outlined above a legally binding requirement. The Proposed Development is therefore considered compliant with the relevant policies and objectives set out at both the European (e.g. European Green Deal) and National tiers of governance in this regard. Report of the Joint Committee on Climate Action - Climate Change: A Cross-Party Consensus for Action (2019)

In March 2019, the Joint Committee on Climate Action Change released a report detailing a cross party consensus for action. The report in its introduction states that *"Irelands performance in meeting international obligations has to date been poor"* (refer to *'Emissions Projections for Ireland'* below). The Report highlights on-going concern regarding emission projections and growing evidence that Ireland is off track in meeting its 2030 targets under the relevant the EU Directives.

The report states that the transformation of Ireland's energy system will be required for the country to meet its future 2030 and 2050 GHG emission targets; specifically, in order to reach net zero emissions by 2050, Ireland will be required to fully decarbonise electricity generation. Therefore, there is a clear incentive for developing, and safeguarding, Ireland's capacity in renewable energies and renewable electricity. Since this report was published, the Climate Action and Low Carbon Development (Amendment) Act 2021 has been enacted and there have been recent progress / future scenario assessments (e.g. EirGrid's 'All Island Generation Capacity Statement 2021 – 2030' (September 2021)).

Given the clear concern that the county's future emissions targets may be missed, it is crucial that projects such as the Proposed Development which can contribute in a meaningful manner towards climate change targets and which can be provided without significant adverse environmental effects arising are brought forward and supported with favourable consideration through the planning system and constructed.

Report of the Joint Committee on Climate Action - Climate Change: A Cross-Party Consensus for Action (2019)

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(Amendment) Act 2021 has been enacted and there have been recent progress / future scenario assessments (e.g. EirGrid's 'All Island Generation Capacity Statement 2021 – 2030' (September 2021)).

Climate Action Plan 2021 (the "Plan")

The Climate Action Plan 2021 ('the Plan') published on the 4th of November 2021, sets out the detail for taking action to achieve a 51% reduction in overall greenhouse gas emissions by 2030, and to reach net-zero emissions by no later than 2050. The 2021 Plan builds on the measures and technologies set out in the 2019 Climate Action Plan to deliver greater ambition. The greater ambition requires a greater range of measures under the 2021 Plan, reflected in two categories of 'core measures' and 'further measures. 'Core measures' set out to meet the 2030 targets cover the fundamentals of decarbonisation and include the development of a renewable energy electricity supply. These 'core measures' are not, by themselves sufficient to deliver the ambitions set out and so a series of 'further measures' will also be necessary which are more technically challenging or not yet available in Ireland at the scale required, e.g. Biogas/biomethane, green hydrogen, carbon capture and storage. While deploying all the core measures would reduce emissions by 10-11 MtCO2eq. by 2030, undertaking further measures could close the gap. All sectors will have to further their efforts from those outlined in the 2019 Plan if the core and further measures are to be achieved. Figure 4.3 of the Plan, copied below illustrates the impacts across the sectors.

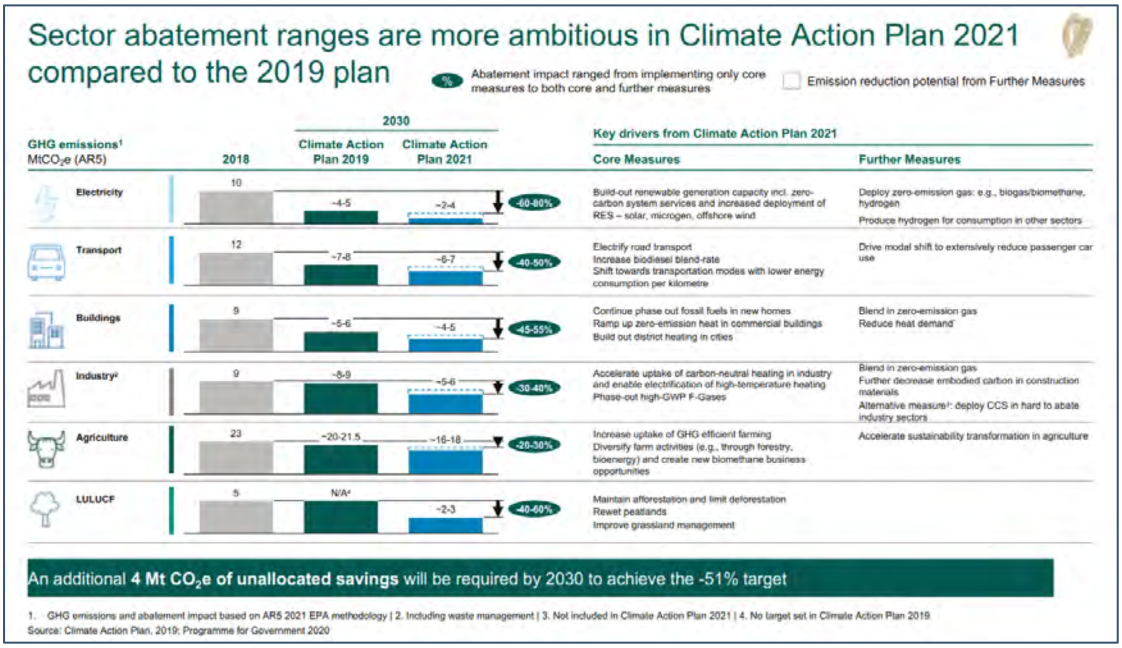

Figure 2-1: CAP 2021 and CAP 2019 Sector Abatement Ranges

With regards electricity, the Plan aims to increase the proportion of renewable electricity up to 80% by 2030. The Plan highlights that *"sustained efforts across sectors will be required to meet targets"* and for electricity "*The proposed pathway includes a more rapid build-out of renewable generation capacity (wind and solar power generation technologies), increased storage, and the deployment of zero-emissions gas. The decarbonisation pathway for the electricity sector is challenging given the rapid growth in demand for power, as well as the need to ensure security of supply through the decarbonisation journey."* To achieve the 80% renewable electricity envisioned, the indicative onshore wind capacity is set in the Plan at up to ~8GW.

Section 11 of the Plan considers electricity specifically and notes that in 2018 electricity accounted for 16.2% of Irelands greenhouse gas (GHG) emissions. The intention is to continue to decarbonise the electricity sector by "taking advantage of our significant renewable energy resources…" The Plan continues:

> *"The share of electricity from renewable energy increased almost five-fold between 2005 and 2018 – from 7.2% to 33.7% – an increase of over 26 percentage points in 13 years. This increase in the share of renewables came despite a rise in the total demand for electricity. In absolute terms, there has been a more than six-fold increase in the volume of renewable electricity generated, from 1,873 GWh in 2005 to 11,780 GWh in 2019."*

Despite the positive trends, the Plan states that "Additional electricity generation and transmission infrastructure will be a critical enabler to achieve our renewable energy and emissions targets" and "total electricity demand over the next ten years is forecast to grow by between 19% and 50%..." The dedicated electricity targets to meet the required level of emissions reduction by 2030 are set out at Section 11.2 of the Plan as follows:

- Reduce CO2eq. emissions from the sector to a range of 2 to 4 MtCO2eq. by 2030
- Carry out a work programme to identify a route to deliver 1-3 TWh of zero emissions gas (including green hydrogen) by 2030, potentially equivalent to 0.2-0.4 MtCO2eq. abatement

The climate targets set out will be delivered through a set of enabling targets by 2030, as follows:

- "Increasing the share of electricity demand generated from renewable sources to up to 80% where achievable and cost effective, without compromising security of electricity supply
- At least 500 MW of these renewables will be delivered through local community-based projects, subject to competition as appropriate
- Deliver circa 2 GW of new flexible gas-fired power stations in support of a high variable renewable electricity system
- Delivery of three new transmission grid connections or interconnectors to Northern Ireland, Great Britain, and the EU
- Explore further interconnection, including hybrid interconnectors (combined cross border transmission network with offshore renewable generation), to other countries
- Expand and reinforce the grid – through the addition of lines, substations, and new technologies
- Complete the phase-out of coal and peat-fired electricity generation
- Ensure that 20-30% of system demand is flexible by 2030"

Large scale renewable generation is identified as a key measure in meeting the targets set out and includes: (inter alia)

- *"Achieving the renewable electricity target of up to 80% will entail investment of tens of billions of euro, including in the installation and maintenance of generation assets, and associated infrastructure and services, as well as in the development of supply chains and port infrastructure*
- *The SEAI's Methodology for Local Authority Renewable Energy Strategies (LARES) will be revised, with input from relevant bodies, to provide a best practice approach to identifying and assessing renewable energy resources in spatial planning at local authority level. Based on the indicative targets for onshore wind energy and grid-scale solar deployment, the Department of the Environment, Climate and Communications (DECC) will set out a target for the total onshore capacity that should be planned for on a national and regional level. The regional assemblies will be required to develop and implement regional renewable electricity strategies based on the overall national targets, renewable energy objectives contained in each of the Regional Spatial and Economic Strategies, and the support of relevant guidance, including the SEAI LARES. National renewable energy objectives, and those set out in the regional strategies, should be reflected in County Development Plans, which are evaluated and assessed by the Office of the Planning Regulator*
- *We will continue to roll out regular competitive auctions under the Renewable Electricity Support Scheme (RESS) to deliver our targets and ensure a steady supply pipeline of projects and efficient use of the network. We will publish an indicative RESS auction timetable every three years to provide clarity for investors*

- *EirGrid will carry out further grid, operational and market studies to understand any additional measures, beyond current plans, to facilitate reduced sectoral emissions ceilings and, therefore, support annual renewable electricity share of up to 80%"*

A range of specific Actions are set out in the Plan with regards the various sectors; for the electricity sector the following are specifically relevant:

- Action 100: "Ensure a supportive spatial planning framework for onshore renewable electricity generation development."
- Action 102: "Deliver regular Onshore Renewable Electricity Support Scheme auctions that aligns with spatial and planning policy and efficient use of the network."
- Action 112: "Develop the onshore electricity grid to support renewable energy targets."

Emissions Projections for Ireland (2020 – 2040)

In June 2021, the EPA published an update on *Ireland's Greenhouse Gas Emission Projections 2020-2040* (the "Report") using the latest Inventory data for 2019. The report provides an assessment of Ireland's progress towards achieving its emission reduction targets for 2020 and 2030 as set out under the EU Effort Sharing Decision (ESD) and Effort Sharing Regulation (ESR). Ireland's 2020 target under the ESD is to achieve a 20% reduction on 2005 levels of non-Emissions Trading Scheme (non-ETS) sector emissions (agriculture, transport, residential, commercial, non-energy intensive industry, and waste) with annual binding limits are set for each year over the period 2013-2020. Ireland's 2030 target under the Effort Sharing Regulation (ESR) is a 30% reduction of emissions compared to 2005 levels by 2030. The key findings set out within the report concerning Ireland's progress towards these targets, and relevant to the subject development, the overall decarbonising of the national energy system, are summarised below:

- **2020 Targets:** Ireland's emissions covered by the 2013-2020 EU Effort Sharing Decision target are estimated to have been 7% below 2005 levels in 2020. Ireland is estimated to have cumulatively exceeded its compliance obligations by 12.2 Mt CO2 eq over the 2013-2020 period, and will need to use credits and/or purchase surplus annual emission allocations from other member states to achieve compliance.

- **2030 Targets:** These Projections indicate that Ireland can meet its non-ETS EU targets over the period 2021 to 2030 assuming full implementation of the 2019 Climate Action Plan and the use of the flexibilities available. Future, more ambitious targets as presented in the European Climate Law and Ireland's Climate Bill will require many (as yet unidentified) additional measures.

- **Decarbonising Electricity Generation:** Increased renewable electricity generation, including a projected 5GW of offshore wind generation, is expected to contribute to a 70% contribution of renewable energy in electricity generation by 2030. Energy industries emissions are projected to decrease by one third by 2030 compared to the most recent figures in 2019.

The Climate Action and Low Carbon Development (Amendment) Act 2021 has been brought into force since this Report was published and Ireland's up to date objectives are set out above.

The Report assesses the future emission projections under two scenarios: 'With Existing Measures' and 'With Additional Measures'. The 'With Existing Measures' scenario assumes that no additional policies and measures, beyond those already in place by the end of 2019 are implemented. The 'With Additional Measures' scenario assumes implementation of the 'With Existing Measures' scenario in addition to further implementation of Government renewable and energy efficiency policies and measures, as set out in the CAP 2019. Greenhouse gas emissions projections show total emissions decreasing from 2019 levels by 3% by 2030 under the With Existing Measures scenario and by 20% under the With Additional Measures scenario.

The energy sector contributed 15.8% of Ireland's total emissions in 2019 and is projected to decrease to 13.3% in 2030 (in the With Additional Measures scenario). The key trends underpinning the future progress of the sector under both scenarios are described below (underlined for emphasis):

- With Existing Measures

  a. Emissions from the energy industries sector are projected to increase by 1.4% to 8.6 Mt CO2 eq over the period 2020 to 2030
  b. In terms of the renewable energy generated, this scenario projects Ireland reaching approximately 40% of electricity consumption from renewable energy by 2020. Renewable electricity generation capacity is dominated by wind energy. In 2030 it is estimated that renewable energy generation increases to approximately 55% of electricity consumption.

- With Additional Measures

  c. Emissions from the energy industries sector are projected to decrease by 24.8% to 6.3 Mt CO2 eq over the period 2020 to 2030
  d. Assumed that for 2020 there is approximately a 40% share of renewable energy in electricity generation. In 2030 it is estimated that renewable energy generation increases to approximately 70% of electricity consumption. This is mainly a result of further expansion in wind energy (comprising 3.5 GW offshore and approximately 8.2 GW onshore).

In the context of Ireland's failure to meet the 2013-2020 EU targets for greenhouse gas emissions reductions and the possible outcomes under the above scenarios, the EPA emphasises the need for a 'significant and immediate' response to reducing carbon emissions:

> *"However, for Ireland to meet the more ambitious targets as presented in the European Climate Law [55% emission reduction by 2030 as per 1990 levels] and Ireland's Climate Bill [51% emission reduction by 2030], and to transform to a climate resilient, biodiversity rich and climate neutral economy by 2050, there needs to be a significant and immediate increase in the scale and pace of greenhouse gas emission reductions. A 'green recovery' will give Ireland an opportunity to rebuild our economy and generate new jobs while responding to this challenge."*

While it is clear that progress is on-going, it is also apparent that there are still significant challenges which will need to be overcome if Ireland is to achieve its 2030 emission targets. Specifically, the EPA states that the level of annual emissions reductions required to achieve a 51% emissions reduction by 2030 (Climate Action and Low Carbon Development (Amendment) Act 2021) is far greater than what is estimated to have occurred due to the COVID lockdown measures in 2020. As decarbonising electricity generation will have a significant positive contribution in achieving Ireland's emissions it is clear that additional renewable energy production such as that of the Proposed Development must be encouraged and supported if carbon saving targets are to be met.

2.1.1.3 Summary of Compliance with Climate Change Policy

As noted previously the Dunneill Wind Farm is operational and has been since 2010 when it was commissioned. The wind farm has been generating renewable electricity and supplying to the national grid over the last 11 years. The proposal to extend the operational period of the development will therefore aid in the overall supply of renewables therefore increase the amount of renewable energy that will be available on the national grid and will contribute to Irelands efforts and stated policy to decarbonise the economy. The proposed renewable energy will help Ireland address the challenge of decarbonising electricity generation as well as addressing the country's over-dependence on imported fossil fuels.

2.1.1.4 Renewable Energy Policy and Targets

Renewable energy development is recognised as a vital component of Ireland's strategy to tackle the challenges of combating climate change and ensuring a secure supply of energy. Ireland's import dependency was 67% in 2018, down from an average of 89% between 2001 and 2015, arising from the beginning of production of gas from the Corrib field and increasing use of indigenous renewable energy. Notwithstanding this improvement, Ireland remains one of the most import fuel dependent countries in the EU; specifically, oil accounted for 73% of total energy imports, natural gas 17%, coal 8.2% and renewables 1.4%[5]. SEAI's 'Energy in Ireland – 2020 Report' (December 2020) further expands upon the above analysis, noting that "*Oil has by far the largest share of final energy use at 57% in 2019, more than all other fuel types combined. Transport and home heating account for 86% of oil use.*" The most significant changes noted in the report in terms of fuels included:

- Fossil fuels accounted for 87% of all the energy used in Ireland in 2019. Demand for fossil fuels fell by 3% in 2019, and was 17% lower than in 2005;
- Coal use decreased by 53% in 2019 and its share of total primary energy requirement fell to 2.6%, down from 10.5% in 2015.
- Total renewable energy increased by 10.3% during 2019. Hydro and wind increased by 28% and 16% respectively. The overall share of renewables in primary energy stood at 11.2% in 2019, up from 10% in 2018.
- Ireland returned to being a net importer of electricity in 2019 for the first time since 2015, importing 55 ktoe.

This high dependency on energy imports is highly risky and Ireland is currently extremely vulnerable both in terms of meeting future energy needs and ensuring price stability. Against this backdrop, the SEAI states that,

> *"The development of indigenous, distributed renewable energy sources mitigates many of the risks associated with relying on global supply chains and large single pieces of infrastructure, and reduces the exposure to fossil fuel price shocks."*

The Programme for Government (2020) also highlights the need for a clean and reliable supply of energy:

> *"Energy will play a central role in the creation of a strong and sustainable economy over the next decade. The reliable supply of safe, secure and clean energy is essential in order to deliver a phase-out of fossil fuels. We need to facilitate the increased electrification of heat and transport. This will create rapid growth in demand for electricity which must be planned and delivered in a cost-effective way."*

The projected demand for electricity is clear and to meet that demand viable projects such as that the proposed renewable energy development can directly contribute to Ireland's energy and climate targets.

2.1.1.5 EU Legislation

The 2030 Climate and Energy Framework (adopted by EU leaders in October 2014) represents the current governance system underpinning EU renewable energy policy. The framework defines EU wide renewable energy targets, which builds on the 2020 climate and energy package:

- A binding commitment at EU level of at least 40% domestic Green House Gas reduction by 2030 compared to 1990;
- An EU wide, binding target of at least 27% renewable energy by 2030; and
- An indicative EU level target of at least 27% energy efficiency by 2030.

[5] *SEAI 'Energy Security in Ireland – 2020 Report' (September 2020)*

The European Commission published its proposal for an Effort Sharing Regulation on the allocation of national targets for greenhouse gas emissions for the period 2021-2030 in May 2018. The Effort Sharing legislation forms part of a set of policies and measures on climate change and energy that will help move Europe towards a low-carbon economy and increase its energy security. Under the current Regulation, the national targets will collectively deliver a reduction of around 10% in total EU emissions from the sectors covered by 2020 and of 30% by 2030, compared with 2005 levels.

The proposal implements EU commitments under the Paris Agreement on climate change (COP21), discussed above in Section 2.1.1.1, and marks an important milestone in the allocation to Member States of a package of climate targets formally adopted as part of the 2030 Climate and Energy Framework.

The revised Renewable Energy Directive (EU) 2018/2001 came into force in December 2018. It establishes a binding EU target of at least 32% for 2030 with a review for increasing this figure in 2023. The revised Directive sets a 2030 target of 32.5% energy from renewable sources with a potential upward revision in 2023.

The European Green Deal was launched in December 2019 and proposes to increase the binding target of renewable sources in the EU's energy mix from 32% to 40% by 2030 via amendments to the Renewable Energy Directive (Renewable Energy Directive) as per the 'Fit for 55' package (July 2021)[6]. This supports Member States in making the most of their cost-effective renewable energy potential across sectors through a combination of sectoral targets and measures. It aims at making the energy system cleaner and more efficient by fostering renewables-based electrification and, in sectors such as industry and transport where this is more difficult, it will promote the uptake of renewable fuels.

Energy Roadmap 2050

The Energy Roadmap 2050 was published by the European Commission in 2011 and analyses the transition of the contemporary energy system in ways that would be compatible with the greenhouse gas reductions targets as set out in the Renewable Energy Directive (Directive 2009/28/EC) while also increasing competitiveness and security of supply. To achieve these targets and objectives, the Roadmap states that significant investments will need to be made in new low-carbon technologies and renewable energy, e.g. wind energy infrastructure, energy efficiency and grid infrastructure. Five main routes are identified to achieving a more sustainable, competitive and secure energy system in 2050:

- High Energy Efficiency;
- Diversified Supply Technologies;
- High Renewable Energy Sources;
- Nuclear energy; and
- Carbon capture and storage.

The analysis found that decarbonising the energy system is technically and economically feasible. The Roadmap notes that all scenarios show the biggest share of energy supply technologies in 2050 comes from renewables. In this regard, it should be noted that the Climate Change Advisory Council states within their 2020 Annual Review (September 2020) that, "*while the share of renewable electricity generation, particularly wind, is increasing [in Ireland], the [overall] pace of decarbonisation of the [electricity generation] sector needs to accelerate*", as it is not compatible with a low-carbon transition to 2050. As such, a major prerequisite for a more sustainable and secure energy system is a higher share of renewable energy up to and beyond 2030 to 2050. Each of the scenarios assumes in the analysis that increasing the share of renewable energy and using energy more efficiently are crucial, irrespective of the particular energy mix chosen.

[6] *https://www.consilium.europa.eu/en/policies/eu-plan-for-a-green-transition/*

Progress on Targets

The SEAI *Renewable Energy in Ireland 2020 Update* was published in April 2020 and set outs the most recent updates to Ireland's progress towards its binding European and National renewable energy targets. Based on confirmed 2018 data, the primary conclusion of the report relates to Ireland's overall renewable energy supply representing 11% of gross final consumption (EU target of 16%). Against this backdrop, Ireland had the second lowest progress to meeting the overall RES target of all EU Member States (26th out of the EU-28). With regard to Ireland's national renewable energy target for 2020, the 2018 data indicates that Ireland is not on track to meet any of its 2020 renewable energy targets:

- 33.2% renewable electricity by 2020 (target is 40%) - up from 30.1% in 2017;
- 6.5% renewable heat by 2020 (target is 12%); and
- 7.2% renewable transport by 2020 (target is 10%).

The Climate Change Advisory Council notes within their *2019 Annual Review* that while the share of renewable electricity generation, particularly wind, is increasing in Ireland, the pace of decarbonisation of the electricity generation sector is not compatible with a low-carbon transition to 2050. As such, Ireland can continue to 'comply' with EU targets by purchasing emission allowances; however, the expenditure of public funds to do so would not result in any domestic benefit, and furthermore, would result in a more difficult and expensive challenge for the county to meet its future 2030 targets and beyond. The *Review* concludes that continued and additional investment in capacity and technologies in the renewable energy sector is required to reach these said targets.

Drawing on the 2030 Climate and Energy Framework EirGrid's *'All Island Generation Capacity Statement 2021 – 2030'* (September 2021) states that the national power system will require unprecedented change over this decade, "a fundamental transition for our electricity sector", in order to accommodate at least 70% of electricity from renewable sources by 2030. The retiring of traditional fossil fuel plant (coal, peat and oil-fired generators), c. 1,650MW of generation over the next 5-years within Ireland, further emphasises the need for a deliberate and swift transition to a low-carbon power system based on renewable energy, natural gas and ancillary supporting infrastructure. With regard to wind energy, the *All Island Generation Capacity Statement 2021 – 2030* states that,

> *"It can be assumed that Ireland's renewable targets will be achieved largely through the deployment of additional wind powered generation."*

New onshore wind farms commissioned in Ireland in 2020 brought the total wind capacity to 4,300MW, contributing to the increase in overall RES percentage to 43.3%. This value is set to increase as Ireland endeavours to meet its 2030 renewable targets; specifically, the *All Island Generation Capacity Statement 2021 – 2030* estimates that onshore wind energy will increase by 1,000MW between 2020 and 2025. With regard to wind energy, the Statement states that,

> *"It can be assumed that Ireland's renewable targets will be achieved largely through the deployment of additional wind powered generation."*

Long-term system electricity demand in Ireland is increasing and is forecast to increase significantly, due to the expected expansion of many large energy users (e.g. data centres). EirGrid's analysis concludes that, for the Median demand level, there may not be adequate generation capacity to meet demand from 2026 for Ireland should Moneypoint power station close and long term demand continue to rise. In a scenario where any other plant of equivalent capacity closes during this timeframe, earlier deficits could arise. EirGrid also references poor availability of the generation fleet, as exemplified within 2018 and 2019, could give rise to adequacy deficits in 2025. In this context, the importance of wind energy becomes more apparent as it is estimated that 1 MW of wind capacity can provide enough electricity to supply approximately 650 homes[7]. Accordingly, the Proposed Development will serve to only contribute to meeting this increasing electricity demand.

EirGrid have also released their Strategy 2020-2025: Transform the Power System for Future Generations which is driven by climate change and the need to transform the electricity sector. Currently, the electricity grid can operate with up to 65% of renewable power but by 2030 this must increase to 95%. SEAI 's National Energy Projections to 2030 notes that wind energy deployment has "made the most significant contribution to RES-E to date. The historic build rate (2005-2010) was 180MW per year. Since 2010 the build rate has increased to an average of over 200MW per year. In 2017 the installed capacity increased by 335MW to just over 3.3GW total installed capacity." Furthermore, "Post 2020, as electricity demand continues to grow at an anticipated rate of 3% per annum, increasing levels of deployment will be needed just to maintain the share achieved in 2020."

The Proposed Development through extending the operational life of the Dunneill Wind Farm will continue Ireland's push towards meeting the various statutory targets.

2.1.1.6 National Policy on Renewable Energy

White Paper on 'Ireland's Transition to a Low Carbon Energy Future' 2015 – 2030

On 12th May 2014, the Green Paper on Energy Policy in Ireland was launched which marked the start of a public consultation process on the future of Ireland's energy policy over the medium to long-term. The Department of Communications, Climate Action & Environment acknowledged that energy is an integral part of Ireland's economic and social landscape and that "a secure, sustainable and competitive energy sector is central to Ireland's ability to attract and retain Foreign Direct Investment and sustain Irish enterprise. The three key pillars of energy policy are to focus on security, sustainability and competitiveness".

Following on from an extensive consultation process, a Government White Paper entitled 'Ireland's Transition to a Low Carbon Energy Future 2015-2030' was published in December 2015 by the (then) Department of Communications, Energy and Natural Resources ("DCENR"). This Paper provides a complete energy update and a framework to guide policy up to 2030. The Paper builds upon the White Paper published in 2007 and takes into account the changes that have taken place in the energy sector since 2007.

The policy framework was developed to guide policy and actions that the Irish Government intends to take in the energy sector up to 2030 and also reaching out to 2050 to ensure a low carbon future that maintains Ireland's competitiveness and ensures a supply of affordable energy. The Energy Vision 2050, as established in the White Paper, describes a 'radical transformation' of Ireland's energy system which will result in GHG emissions from the energy sector reducing by between 80% and 95%, compared to 1990 levels. The paper advises that a range of policy measures will be employed to achieve this vision with emphasis on the generation of electricity from renewable sources, which there are plentiful indigenous supplies and increasing the use of electricity and bio energy to heat homes and fuel transport.

In this White Paper, the DCENR acknowledges that onshore wind is one of the cheapest forms of renewable energy in Ireland, stating that:

> *"Onshore wind continues to be the main contributor (18.2% of total generation and 81% of RES-E in 2014). It is a proven technology and Ireland's abundant wind resource means that a wind generator in Ireland generates more electricity than similar installations in other countries. This results in a lower cost of support."*

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[7] *https://www.iwea.com/about-wind/faqs*

National Energy Security Framework

More recently, the National Energy Security Framework (April, 2022) highlights clearly the impacts the Russian invasion of Ukraine and the resulting war has had on Europe's energy system. The resulting decision by the European Union to phase out the import of Russian gas, oil and coal has brought to the fore the importance of security of supply and how energy policy is designed for long-term resilience. It takes account of the need to decarbonise society and economy, to reduce Ireland's emissions by 51% over the decade to 2030 and reach net zero emissions by 2050. According to the SEAI's Energy in Ireland (2020) report, oil accounts for 54% of Ireland's primary energy requirement making it one of the highest rate of oil dependency in the EU. The International Energy Agency, of which Ireland is a member country, includes a 10-point plan to cut oil use which calls for an acceleration in the deployment of wind and solar projects. Ireland's response per the Framework is set out over three themes:

- *Theme 1 – managing the impact on consumers and businesses*
- *Theme 2 – ensuring security of energy supply in the near-term*
- *Theme 3 – reducing our dependency on imported fossil fuels in the context of the phasing out of Russian energy imports across the EU*

2.2 Planning Policy Context

2.2.1 National Policy

2.2.1.1 National Planning Framework: Project Ireland 2040

The National Planning Framework ('NPF'), published in February of 2018, aims to shape and guide the future growth and development of Ireland up to 2040 and supersedes the National Spatial Strategy 2002-2020 ('NSS').

The NPF notes that while the overall quality of the country's environment is good it is not without challenges. The NPF notes that the manner in which we plan for potential issues is important in the context of sustainability of our environment.

> *"While the overall quality of our environment is good, this masks some of the threats we now face. Key national environmental challenges include the need to accelerate action on climate change, health risks to drinking water, treating urban waste water, protecting important and vulnerable habitats as well as diminishing wild countryside and dealing with air quality problems in urban areas. It is also important to make space for nature into the future, as our population increases."*

A key aspect of the NPF surrounds the long-term sustainability of the environment, it aims to ensure that decisions that are made today meet our future needs in a sustainable manner.

> *"The manner in which we plan is important for the sustainability of our environment. Our planning system has influence across a wide range of sectors, both directly and indirectly and interacts with many common issues related to effective environmental management, including water services, landscape, flood risk planning, protection of designated sites and species, coastal and marine management, climate mitigation and adaptation, and land use change."*

The Government will address environmental and climate challenges through the following overarching aims as listed under 'Resource Efficiency and Transition to a Low Carbon Economy':

- Sustainable Land Management and Resource Efficiency
- Low Carbon Economy
- Renewable Energy

- Managing Waste

The NPF notes that the population of Ireland is projected to increase by approximately 1 million people by 2040 and that in order to strengthen and facilitate more environmentally focused planning at the local level, the NPF states that future planning and development will need to:

> *"Tackle Ireland's higher than average carbon-intensity per capita and enable a national transition to a competitive low carbon, climate resilient and environmentally sustainable economy by 2050, through harnessing our country's prodigious renewable energy potential."*

In order to meet legally binding targets agreed at EU level, it is a national objective for Ireland to make a transition and become a competitive low carbon economy by the year 2050. To aid in meeting these targets the National Planning Framework notes that the Government will aim to support the following objectives:

- Integrating climate considerations into statutory plans and guidelines. In order to reduce vulnerability to negative effects and avoid inappropriate forms of development in vulnerable areas.
- More energy efficient development through the location of housing and employment along public transport corridors, where people can choose to use less energy intensive public transport, rather than being dependent on the car.

The NPF highlights that Ireland's national energy policy is focused on three pillars: (1) sustainability, (2) security of supply and (3) competitiveness. Furthermore, it is noted that *"The Government recognise that Ireland must reduce greenhouse gas emissions from the energy sector by at least 80% by 2050, compared to 1990 levels, while at the same time ensuring security of supply of competitive energy sources to our citizens and businesses.*" The NPF notes that our transition to a low carbon energy future requires:

- A shift from predominantly fossil fuels to predominantly renewable energy sources.
- Increasing efficiency and upgrades to appliances, buildings and systems.
- Decisions around development and deployment of new technologies relating to areas such as wind, smartgrids, electric vehicles, buildings, ocean energy and bio energy.
- Legal and regulatory frameworks to meet demands and challenges in transitioning to a low carbon society.

The transition towards a low carbon and climate resilient society is identified as one of the national strategic outcomes to guide the implementation of the NPF. National Policy Objective 55 of the NPF specifically relates to renewable energy, stating it is an objective to:

> *"Promote renewable energy use and generation at appropriate locations within the built and natural environment to meet national objectives towards achieving a low carbon economy by 2050".*

National Strategic Outcome 8-Transition to a Low Carbon and Climate Resilient Society aims to

> *"Deliver 40% of our electricity needs from renewable sources by 2020 with a strategic aim to increase renewable deployment in line with EU targets and national policy objectives out of 2030 and beyond."*

The NPF further emphasises that new energy systems and transmission grids will be necessary for a more distributed, more renewables focused energy generation system to harness the considerable on-shore and off-shore potential from energy sources such as wind, wave and solar and "connecting the richest sources of that energy to the major sources of demand". The NPF recognises that the development of on-shore and off-shore renewable energy is critically dependent on the development of enabling infrastructure including grid facilities to connect to major sources of energy demand.

2.2.1.2 National Development Plan 2021 – 2030

The National Development Plan 2021 – 2030 (NDP) was published on the 4th October 2021 and sets out the major public investment projects identified by Government which are to play a significant role in addressing the opportunities and challenges faced by Ireland over the coming years such as Covid-19, Brexit, housing, health, population growth, and most relevant to the subject development, climate change. It is stated that the NDP 2021 – 2030 will be the *'largest and greenest ever delivered in Ireland'*, and in this regard, the NDP highlights that extensive consultation was undertaken to ensure that the plan adequately supports the implementation of climate action measures. Reflecting on the recent publication of the IPCC's 6th Assessment Report, the NDP notes that the Irish Government is fully committed to 'playing its part' to ensure that the worst climate change damage can be avoided, e.g. significant reductions in CO_2 and other greenhouse gas emissions as assisted by the achievement of both European and National renewable energy targets. Specifically, the NDP states that,

> *"The next 10 years are critical if we are to address the climate crisis and ensure a safe and bright future for the planet, and all of us on it.*
>
> *The investment priorities included in this chapter [Ch. 13] must be delivered to meet the targets set out in the current and future Climate Action Plans, and to achieve our climate objectives. The investment priorities represent a decisive shift towards the achievement of a decarbonised society, demonstrating the Government's unequivocal commitment to securing a carbon neutral future."*

Notwithstanding this, the NDP acknowledges that it is not its role to set out a specific blueprint for the achievement of Ireland's climate targets; but as noted above, facilitate capital investment allocations for the climate and environmental strategic priorities.

One of the NDP's strategic climate priorities in the need for low-carbon, resilient electricity systems; specifically, the plan commits to <u>increasing the share of renewable electricity up to 80% by 2030</u>. This is characterised by the NDP as an '*unprecedented commitment to the decarbonisation of electricity supplies*' which, if compared to the extant CAP 2019 and the objective to meet 70% renewable energy share by 2030, is certainly ambitious and an explicit driver for the deployment of new renewable generators and the safeguarding / maintenance of existing assets, e.g. the subject development. It is noted that the reliability of electricity supplies will also be strengthened through investment in the electricity transmission and distribution grid. The focus of investment in regulated network infrastructure is to contribute to a long-term, sustainable and competitive energy future for Ireland.

2.2.2 Regional Policy

2.2.2.1 Regional Spatial and Economic Strategy for the Northern & Western Region

The strategic objectives of the NPF are implemented at a regional level by the Northern and Western Regional Assembly's Regional Spatial and Economic Strategy (RSES) 2020-2032. The RSES provides a 12-year strategy to "*deliver the transformational change that is necessary to achieve the objectives and vision of the Assembly."*

The RSES sets out ten **Strategic Outcomes**, number **8** of which includes:

> *"Transition to low carbon and climate resilient society - The National Climate Policy Position establishes the national objective of achieving a transition to a competitive, low carbon, climate-resilient and environmentally sustainable economy by 2050. This objective will shape investment choices over the coming decades. New energy systems and transmission grids will be necessary for a more distributed, renewables focused energy generation system, harnessing*

> *both the considerable on-shore and off-shore potential from energy sources such as wind, wave and solar and connecting the richest sources of that energy to the major sources of demand."*

Growth ambition 1 of the RSES relates to the economy and employment, noting that "*energy is needed for economic growth...decarbonisation can and needs to happen and it is an objective of the NPF that Ireland becomes a Low Carbon Economy by 2050. This reflects the Government's 2014 National Policy Position on Climate Action and Low Carbon Development and is also a binding EU requirement."*

It is further noted that "*It is important that out region sets out its ambitions concerning renewable energy in this context and shows its ability to help contribute to achieving national targets."*

The RSES recognises that the region has "*huge potential for growth in renewables, with its diverse and growing environmental goods and services sector, and not least because of the proactivity and drive with which it embraces this agenda."* With that in mind three specific Regional Policy Objectives (RPOs) are considered particularly relevant to the proposed development:

Regional Policy Objective RPO 4.17

> *"To position the region to avail of the emerging global market in renewable energy by:*

- Stimulating the development and deployment of the most advantageous renewable energy systems
- Supporting research and innovation
- Encouraging skills development and transferability
- Raising awareness and public understanding of renewable energy and encourage market opportunities for the renewable energy industry to promote the development and growth of renewable energy businesses g Encourage the development of the transmission and distribution grids to facilitate the development of renewable energy projects and the effective utilisation of the energy generated from renewable sources having regard to the future potential of the region over the lifetime of the Strategy and beyond."

Regional Policy Objective RPO 4.18

> *"Support the development of secure, reliable and safe supplies of renewable energy, to maximise their value, maintain the inward investment, support indigenous industry and create jobs."*

Regional Policy Objective RPO 5.2

1. "(a) Protect manage and conserve the quality, character and distinctiveness of our Landscapes and seascapes.
2. (b) The Assembly supports co-operation and co-ordination between Local Authorities in determining landscape character along their borders. A targeted review should be undertaken to ensure consistency in classification and policy in adjoining areas of similar character. The NWRA will assist in collaboration and coordination.
3. (c) Following the completion of the National Landscape Character Assessment, and any associated statutory Guidelines, the Regional Assembly shall prepare a Regional Landscape Character Assessment to promote improved landscape management and designation"

It is clear that successfully realising the RSES's renewable energy generation and transmission RPOs will require both investments in renewable electricity and the maintenance of the infrastructure required to enable the safe and secure connection of this electricity to the grid. The subject development is contributing toward the achievement of these long-term objectives concerning delivery of sustainable and secure renewable energy to the region and will continue to do so subject to favourable grant of permission.

2.2.3 Local Policy

2.2.3.1 Sligo County Development Plan 2017-2023

The Sligo County Development Plan 2017-2023 (SCDP) was adopted on the 31st of July 2017 and came into operation on the 28th of August 2017, prepared under Section 11 of the Planning and Development Act 2000 (as amended). The SCDP presents the Council's outlook for the future development of County Sligo and its Gateway City for the period up to 2023, within a long-term perspective.

There is currently no Wind Energy Strategy in place for County Sligo which identifies strategic areas in the county where wind energy developments are generally acceptable, open for consideration or not normally permissible, under objective SO-EN-2 of theSCDP, it is an objective to *"Undertake an analysis of suitable areas for wind energy and prepare a map showing County Sligo's Landscape Suitability for Wind Energy Developments, in accordance with Section 3.5 of the Wind Energy Guidelines (2006) and any subsequent revisions",* this has not been undertaken to date.

Section 10.6 of the SCDP sets out the councils' consideration regarding climate change in the context of the County. In this regard, it is clear that the SCDP promotes the development and use of renewable sources of energy. The following is noted:

> *"The burning of fossil fuels for energy has contributed significantly to the build-up of greenhouse gases (GHGs) and the resulting increase in global warming. Energy efficiency and the use of renewable energy help to reduce GHG emissions and therefore play a key role in tackling climate change. Climate and energy issues already have national, regional and cross-border momentum and need to become urgent priorities at local level"*

Under this section the following relevant objectives are included:

- Support for renewable energy production to facilitate the transition to a low-carbon energy system,
- Support for the "green economy" to develop indigenous enterprises, create local employment and secure sustainable economic growth,
- Sustainable and climate-resilient building design, construction and retrofit for higher energy efficiency and enhanced climate adaptation

The following relevant policies are also identified under Section 10 of the SCDP:

- **P-CAM-1** Support the implementation of the National Climate Change Adaptation Framework 2012, by including relevant measures in any forthcoming adaptation plans. Such plans shall be in accordance with national guidance issued by the DoECLG and EPA and undertaken in collaboration with the Northern and Western Regional Assembly, Mayo County Council, Roscommon County Council, Leitrim County Council and Donegal County Council.
- **P-CAM-2** - Prepare a climate change adaptation strategy for County Sligo in compliance with national guidance and in consultation with all relevant stakeholders.
- **P-CAM-3** - Raise public awareness and build local resilience in relation to climate adaptation.
- **P-CAM-4** - Facilitate and assist County Sligo's transition to a low-carbon economy and society.
- **P-CAM-5** - Promote, support and implement measures that reduce man-made GHGs, including energy management, energy efficiency, compact development patterns, low-carbon buildings and sustainable transport.
- **P-CAM-7** - Promote and support the research and development of local renewable energy sources.
- **P-CAM-8** - Promote and support the use of renewable energy in all sectors.

- **P-CAM-9** - Support community participation in, and benefit from, renewable energy and energy efficiency projects.
- **P-CAM-10** Support local innovation, economic activity and job creation in the "green" economy by encouraging investment in products, services and technologies needed in a low carbon future.

Section 11.1 of the SCDP recognizes member States of the EU are required to significantly increase their use of renewable energies and to improve energy efficiency in all sectors, it is further noted that County Sligo is rich in renewable energy resources and *"is well-placed to lay solid foundations for a sustainable energy future. Harnessing this potential will boost a range of sectors, while enhancing energy self-sufficiency. The rewards include inward investment, job creation, business development, rural regeneration and a reduction of fuel poverty."*

Section 11.1.2 calls out the fact that *"Sligo's mountainous landscape and exposed location on the western seaboard combine to create good conditions for the generation of wind power. According to the Irish Wind Energy Association (IWEA), the wind farm capacity available in the County in 2016 was 49.15 MW, produced by five wind farms located at Kings Mountain, Dunneill, Carran Hill, Geevagh and Lackan".* It is noted that pressure for future wind farm development is likely to be concentrated in upland and coastal areas, particularly where energy providers can access the national electricity grid, the siting of wind turbines requires careful consideration. It is a challenge for the Council to achieve a reasonable balance between: (a) responding to government policy on renewable energy; and (b) enabling the wind energy resources of the County to be harnessed in an environmentally sustainable manner. The following relevant policies are listed:

1. **SP-EN-1** Support the sustainable development, upgrading and maintenance of energy generation, transmission, storage and distribution infrastructure, to ensure the security of energy supply and provide for future needs, as well as protection of the landscape, natural, archaeological and built heritage, and residential amenity and subject to compliance with the Habitats Directive.
2. **SP-EN-2** Facilitate the sustainable production of energy from renewable sources, energy conversion and capture in forms such as wind power, hydro-power, wave generated energy, bioenergy, solar technology and the development of Waste to Energy/Combined Heat and Power schemes at appropriate locations and subject to compliance with the Habitats Directive. All such development proposals will be assessed for their potential impact on urban and rural communities, Natura 2000 sites, designated Sensitive Rural Landscapes, Visually Vulnerable Areas, Scenic Routes and scenic views, as well as in accordance with strict location, siting and design criteria.
3. **SP-EN-6** Support the implementation of relevant programmes arising from the Government's Energy White Paper 'Ireland's Transition to a Low Carbon Energy Future 2015-2030 (or any successor document).

Development Management Standards

The Planning Authority will have regard to o the DoEHLG's *Wind Energy Development Guidelines* (June 2006) and any revised guidelines, when considering wind energy applications. Section 13.9.3 Wind Energy Developments sets out the main criteria to be used in assessing wind development proposals. These criteria include:

- Environmental impact – effects on landscape, natural and archaeological heritage,
- Seeking visual harmony and balance – choice of turbines, towers, colour and siting,
- Keeping secondary structures to a minimum – buried on-site cabling, minimal fencing, transformers placed inside towers where possible,
- Keeping access roads to a minimum – using established roads where possible and following natural contours if roads are necessary,
- Managing the building site – removing waste, avoiding erosion, replanting the land.

In assessing proposals for wind farms, the Council will require detailed information to Environmental Impact Assessment (EIA) standard. Assessment in accordance with government guidelines will have regard to visual impact (including the scarring effect of access roads), noise, electro-magnetic interference, ecological impact, safety (including aircraft safety and navigation) and land use implications.

Proposals will generally be discouraged in or close to pNHAs, cSACs, SPAs, designated Sensitive Rural Landscapes, Visually Vulnerable Areas, Scenic Routes, protected views, Zones of Archaeological Potential.

2.2.3.2 Landscape Character Assessment

Landscape Character Assessment (LCA) is a process that describes, maps and classifies landscapes objectively. Sligo County Council does not currently have a Landscape Character Assessment that forms part of its county development plan. As part of the SCDP, Sligo County Council states *'the DAHG's National Landscape Strategy for Ireland 2015–2025 indicates the Department's intention to develop a National Landscape Character Assessment by 2020. The existing LCA for County Sligo may need to be reviewed to ensure consistency with the national assessment and any new departmental guidance.'*

Section 7.4.3 of the SCDP clarifies the above quote, explaining that a landscape characterisation and appraisal study was completed in 1996 which resulted in the classification of different landscape areas of differing sensitivity to development. This is not a full landscape character assessment and is detailed more fully below in Chapter 13 of the EIAR as lodged.

Landscape Policy

The Landscape Character Map classifies the County according to its visual sensitivity and capacity to absorb new development without compromising the scenic character of certain areas. It designates the following:

- **Normal Rural Landscapes:** areas with natural features (e.g. topography, vegetation) which generally have the capacity to absorb a wide range of new development forms – these are largely farming areas and cover most of the County. At the same time, certain areas located within normal rural landscapes may have superior visual qualities, due to their specific topography, vegetation pattern, the presence of traditional farming or residential structures. These areas may have limited capacity for development or may be able to absorb new development only if it is designed to integrate seamlessly with the existing environment.
- **Sensitive Rural Landscapes:** areas that tend to be open in character, highly visible, with intrinsic scenic qualities and a low capacity to absorb new development – e.g. Knocknarea, the Dartry Mountains, the Ox Mountains, Aughris Head, Mullaghmore Head etc.
- **Visually Vulnerable Areas:** distinctive and conspicuous natural features of significant beauty or interest, which have extremely low capacity to absorb new development – examples are the Ben Bulben plateau, mountain and hill ridges, the areas adjoining Sligo's coastline, most lakeshores etc.
- **Scenic Routes:** public roads passing through or close to Sensitive Rural Landscapes, or in the vicinity of Visually Vulnerable Areas, and affording unique scenic views of distinctive natural features or vast open landscapes. In addition to remote views, scenic routes have often a distinctive visual character conferred by old road boundaries, such as stone walls, established hedgerows, lines of mature trees, adjoining cottages or farmyards together with their traditional, planted enclosures etc., all of which warrant protection.

As seen in Figure 2.2 below, all 13 of the turbines are located within an area designated as a 'Normal Rural Landscape', with nearby areas designated as a 'Sensitive Rural Landscape'.

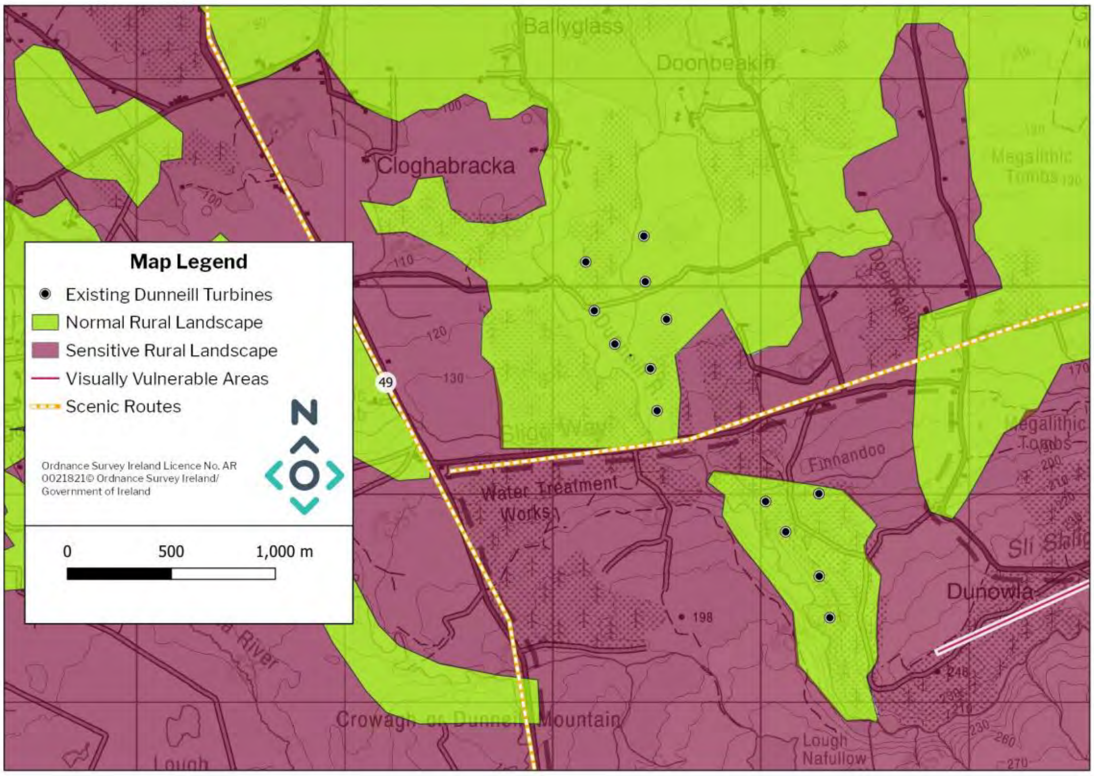


Figure 2-2 Landscape Characterisation proximate to the Dunneill Wind Farm

In relation to landscape character assessment and protection policies, the purpose of established designations is to protect the rural character, setting, historic context and archaeological heritage of the landscape. It is the policy of Sligo County Council to:

- **P-LCAP-1** Protect the physical landscape, visual and scenic character of County Sligo and seek to preserve the County's landscape character. Planning applications that have the potential to impact significantly and adversely upon landscape character, especially in Sensitive Rural Landscapes, Visually Vulnerable Areas and along Scenic routes, may be required to be accompanied by a visual impact assessment using agreed and appropriate viewing points and methods for the assessment.
- **P-LCAP-2** - Discourage any developments that would be detrimental to the unique visual character of designated Visually Vulnerable Areas.
- **P-LCAP-3** Preserve the scenic views listed in Appendix F and the distinctive visual character of designated Scenic Routes by controlling development along such Routes and other roads, while facilitating developments that may be tied to a specific location or to the demonstrated needs of applicants to reside in a particular area. In all cases, strict location, siting and design criteria shall apply, as set out in Section 13.4 Residential development in rural areas (development management standards).
- **P-LCAP-4** Strictly control new development in designated Sensitive Rural Landscapes, while considering exceptions that can demonstrate a clear need to locate in the area concerned. Ensure that any new development in designated Sensitive Rural Landscapes:
  - Does not impinge in any significant way on the character, integrity and distinctiveness of the area;
  - Does not detract from the scenic value of the area;
  - Meets high standards of siting and design;
  - Satisfies all other criteria with regard to, inter alia, servicing, public safety and prevention of pollution.
- **P-LCAP-5** Protect the historic and archaeological landscapes of the County.

Designated Scenic Routes and Visually Vulnerable Areas

The designation of Scenic Routes provides a basis for protecting views and prospects of certain visually vulnerable features. *Appendix E* of the SCDP outlines a list of roads designated as Scenic Routes and details of the scenic views to be preserved. *Appendix E* sets out the counties approach to scenic routes and lists the scenic routes in hierarchical order of national primary roads, national secondary roads, regional roads and local roads and their intended focus of view. The policies pertaining to Scenic Routes and Visually Vulnerable Areas set out in the SCDP including P-LCAP2, P-LCAP3 and P-LCAP4 which are quoted above. The SCDP suggests that any development located within areas along Scenic Routes or within Visually Vulnerable Areas would have an extremely low capacity to absorb new development, particularly P-LCAP2 which states the Council will refuse developments that *"show detrimental effects to the unique visual character of Visually Vulnerable Areas".*

The description for Scenic Routes in the Sligo CDP states that *"it is not necessary for a particular feature to be visible for the full length of a route, as the designation is based on the overall quality and uniqueness of the views available. Due to the strong inter-visibility between landscape elements in County Sligo, most Scenic Routes enjoy scenic views of more than one Visually Vulnerable feature".*

It should be noted, however, that the majority of the Scenic Routes within the study area as outlined in the SCDP, have a focus of view towards the Ox Mountains, located to the southeast of the Dunneill Wind Farm. As seen in 2-2 above, a designated Scenic Route runs adjacent to the Dunneill Wind Farm site as well between the northern and southern cluster. In addition to this, the network of designated Visually Vulnerable Features which generally coincide with the ridgelines of the Ox Mountains begin to the southeast of the Dunneill Wind (See Figures 13-7 and 13-8 in Chapter 13). The network of scenic routes located north of the Dunneill Wind Farm has heavily influenced the selection of viewpoints present later in Chapter 13 of this report.

2.2.3.3 Emerging Sligo County Development Plan 2023-2029

On 30 July 2021, Sligo County Council commenced the review of its County Development Plan (CDP) 2017-2023 in accordance with the requirements of Section 11 of the Planning and Development Act 2000 (as amended). It is envisaged that the Draft Plan will be adopted in 2023. At the time of writing the Pre-Draft Public Consultation on the Preparation of Sligo County Development Plan 2023–2029 has ended.

In the *'Development plans – legal requirements'* section of the Issues Paper, the Council states that a mandatory objective of the development plan includes *"promotion of sustainable settlement and transportation strategies, including measures to reduce energy demand, reduce anthropogenic greenhouse gas emissions and address adaptation to climate change".*

Sligo County Council outlines considerations towards climate change in the 'Climate Change Adaptation and Action' section of the Issues Paper and identifies that the new Development Plan must increase County Sligo's resilience to climate change by promoting sustainable development through appropriate policies which include;

1. *Support for renewable energy production to facilitate the transition to a low-carbon energy system.*
2. *Support for the "green economy" and "circular economy", to develop indigenous enterprises, create local employment and secure sustainable economic growth.*

2.2.3.4 Summary Conclusion on Local Policy

In summary, the SCDP recognises the importance of combating climate change and deriving more energy from renewable sources. Additionally, the Planning Authority acknowledge the role which renewable energy, and (specifically in the context of the Proposed Development) wind energy, has to play in Ireland meeting its energy and climate targets.

As noted, the proposed application is seeking to extend the life of the existing Dunneill Wind Farm for an additional 15 years. In this regard the Proposed Development is seeking to prolong the operating period of generating renewable energy from a permitted wind farm development which essentially pre-dates the current development plan provisions. The overarching policy stance is one of support for continued decarbonisation, while emerging planning policy, at this early stage, appears to be in alignment with this stance. In light of targets and requirements relating to the continued deployment of wing energy across the country, it is considered that the Proposed Development will continue to contribute to the development of a sustainable and diverse renewable energy portfolio to meet the demands of County Sligo as well as significantly contributing to the Irelands binding energy and climate targets.

The current use is well established, the existing wind farm has been operational for more than 11 years and the current proposal is to extend the operational period of this renewable energy development without need for any significant additional works. The Proposed Development will allow for the existing turbines to be maintained and continue to operate on-site, and therefore continue to contribute to achieving national targets. Having been previously permitted under ABP Pl. Ref. 21.204790, the principle for wind energy development at this site is already well established and has been proven to be in accordance with the proper planning and sustainable development of the area.

There is a range of policy in place within the current and draft county plans which strongly support the development and continued supply of renewable energy onto the national grid. Accordingly, the Proposed Development is consistent with the aims and objectives of the Sligo County Development Plan 2017-2023.

2.2.4 Other Relevant Material Considerations

DoEHLG Wind Energy Guidelines 2006

In June 2006, the then Department of Environment, Heritage and Local Government (DoEHLG) published '*Wind Energy Development Guidelines for Planning Authorities*' (the Guidelines) under Section 28 of the Planning and Development Act, 2000. The aim of these guidelines was to assist the proper planning of wind power projects in appropriate locations around Ireland. The Guidelines highlight general considerations in the assessment of all planning applications for wind energy. They set out advice to planning authorities on planning for wind energy through the development plan process and in determining applications for planning permission. They contain guidelines to ensure consistency of approach throughout the country in the identification of suitable locations for wind energy development.

Each wind project has its own characteristics and defining features, and it is therefore impossible to write specifications for universal use. Guidelines should be applied practically and do not replace existing national energy, environmental and planning policy. The Department of the Environment, Community and Local Government published proposed revisions to the guidelines in December 2013 as part of a targeted review relating to Noise, Proximity and Shadow Flicker for discussion. The Department is continuing this review and Draft Revised Guidelines were published in December 2019.

DoHPCLG Interim Guidelines for Planning Authorities on Statutory Plans, Renewable Energy and Climate Change 2017

In July 2017, the (then) Department of Housing, Planning, Community and Local Government (DoHPCLG) published '*Interim Guidelines for Planning Authorities on Statutory Plans, Renewable Energy and Climate Change*' under Section 28 of the Planning and Development Act 2000. Planning authorities are obliged to have regard to guidelines issued pursuant to Section 28 in the performance of their functions under the Planning and Development Act 2000 (as amended).

The guidelines state that it is a specific planning policy requirement under Section 28(1C) of the Act, that in making a development plan with policies or objectives that relate to wind energy developments that a Planning Authority must:

- *Ensure that overall national policy on renewable energy as contained in documents such as the Government's 'White Paper on Energy Policy - Ireland's Transition to a Low Carbon Future', as well as the 'National Renewable Energy Action Plan', the 'Strategy for Renewable Energy' and the 'National Mitigation Plan', is acknowledged and documented in the relevant development plan or local area plan;*
- *Indicate how the implementation of the relevant development plan or local area plan over its effective period will contribute to realising overall national targets on renewable energy and climate change mitigation, and in particular wind energy production and the potential wind energy resource (in megawatts);*

Department Circular PL5/2017

On the 3rd of August 2017, the (then) Department of Housing, Planning and Local Government issued Circular PL5/2017 to provide an update on the review of the wind energy and renewable policies in development plans, and the advice contained within a previous Departmental Circular PL20-13. Circular PL20-13 advised that local authorities should defer amending their existing Development Plan policies in relation to wind energy and renewable energy generally as part of either the normal cyclical six-yearly review or plan variation processes and should instead operate their existing development plan policies and objectives until the completion of a focused review of the Wind Energy Development Guidelines 2006. The new circular (PL05/2017) reconfirms that this continues to be the advice of the Department. The Department circular also sets out the four key aspects of the *preferred draft approach* being developed to address the key aspects of the review of the 2006 Wind Energy guidelines as follows inter alia:

- The introduction of new obligations in relation to engagement with local communities by wind farm developers along with the provision of community benefit measures.

IWEA Best Practice Guidelines for the Irish Wind Energy Industry 2012

The Irish Wind Energy Association (IWEA), now Wind Energy Ireland, published updated Wind Energy Best Practice Guidelines for the Irish Wind Industry in 2012. The guidelines aim to encourage and define best practice development in the wind energy industry, acting as a reference document and guide to the main issues relating to wind energy developments. The purpose of the guidelines is to encourage responsible and sensitive wind energy development, which takes into consideration the concerns of local communities, planners, and other interested groups. The guidelines outline the main aspects of wind energy development with emphasis on responsible and sustainable design and environmental practices, on aspects of development which affect external stakeholders, and on good community engagement practices. In approaching the development of IWEA's guidelines the aim was to be complementary to the Department of the Environment Heritage and Local Government's 'Wind Energy Development Guidelines' (2006).

IWEA Best Practice Principles in Community Engagement 2013

Following on from the IWEA published Best Practice Guidelines in March 2012, the Association extended its guidance with the publication of this Best Practice in Community Engagement and Commitment. IWEA and its members support the provision of financial contributions by wind farm operators to local communities and have sought to formulate best practice principles for the provision of a community commitment. The document sets out IWEA's best practice principles for delivering extended benefits to local communities for wind farm developments of 5 Megawatts (MW) or above.

Best Practice Principles of community engagement when planning the engagement strategy and preparing associated literature are also outlined in the document. The aim of these guidelines is to ensure that the views of local communities are taken into account at all stages of a development and that local communities can share in the benefits.

Further details on the community engagement that has been undertaken as part of the Proposed Development are presented in Section 2.6.3 below.

Code of Practice for Wind Energy Development in Ireland- Guidelines for Community Engagement 2016

In December 2016, the Department of Communications, Climate Action and Environment (DCCAE) issued a Code of Practice for wind energy development in relation to community engagement. The Code of Good Practice is intended to ensure that wind energy development in Ireland is undertaken in adherence with the best industry practices, and with the full engagement of local communities. Community engagement is required through the different stages of a project, from the initial scoping, feasibility and concept stages, right through construction to the operational phase. The methods of engagement should reflect the nature of the project and the potential level of impact that it could have on a community. The guidelines advise that ignoring or poorly managing community concerns can have long-term negative impacts on a community's economic, environmental or social situation. Not involving communities in the project development process has the potential to impose costly time and financial delays for projects or prevent the realisation of projects in their entirety. Community engagement in relation to the Proposed Development is discussed in full in Section 2.6.3 below.

Commission for Regulation of Utilities: Grid Connection Policy 2018

The Commission for Regulation of Utilities (CRU) (previously the Commission for Energy Regulation (CER)) launched a new grid connection policy in March 2018 for renewable and other generators, known as ECP-1, which seeks to allow *"shovel ready"* projects that already have a valid planning permission, connect to the electricity networks. The principal objective which guides this decision is to allow those projects to have an opportunity to connect to the network, along with laying the foundations for future, more regular batches for connection. Applicants for new connection capacity under ECP-1 was published in August 2019 and under ECP-2 published in September 2020. Round ECP-2.2 is due to be published in September 2021, and ECP-2.3 in September 2022.

The enduring connection policy regime replaces the previous 'Gate' system of grid connection applications. The grid connection application window under ECP-1 was the first time since 2007 that certain renewable energy projects including wind farms had an opportunity to secure a new grid connection offer.

This planning application for the Proposed Development does not include the pre-existing connection to the national electricity grid. The Dunneill Wind Farm is connected to the National Grid via an existing medium voltage 20 kilovolt (kV) underground cable which runs east from Dunneill to Kingsmountain Wind Farm, and subsequently on to Cunghill 110 kV substation, located approximately 20 kilometres (km) southeast of the Dunneill wind farm. This grid connection was considered exempted development at the time of construction and was not subject to planning permission. No changes to the grid connection infrastructure are proposed and the Proposed Development will continue to deliver power to the National Grid for the proposed operational extension of 15 years.

Renewable Energy Support Scheme (RESS)

The Climate Action Plan, published in June 2019, is the Government's plan to give Irish people a cleaner, safer and more sustainable future. The Plan sets out actions across every sector which will ensure we meet our future climate commitments. A key part of the Plan is a move to 70% renewable electricity by 2030, a measure which will be driven by the introduction of the Renewable Electricity Support Scheme ('RESS').

The RESS is an auction-based scheme which invites renewable electricity projects to bid for capacity and receive a guaranteed price for the electricity they generate. Terms and Conditions for the first competition (RESS 1:2020) was published in February 2020 and will provide support to renewable electricity projects in Ireland. It is intended that the RESS will deliver, amongst other policy objectives:

> *"An ambitious renewable electricity policy to 2030 increasing energy security, energy sustainability and ensuring the cost effectiveness of energy policy."*

The Auction Scheme and the ECP framework has now been established and is operational and will facilitate and provide a pathway to realise the for renewable electricity (RES-E) ambition of up to 70% by 2030, that has been established.

The second RESS (RESS 2) competition terms and conditions were published in October 2021. The scheme supports the achievement of the increased ambition of up to 80% renewable energy electricity by 2030 as set out under the National Development Plan and Climate Action Plan 2021. The successful projects in the RESS 2 auction have the capacity to increase Ireland's current renewable energy generation by almost 20% and are to be delivered between 2023 and 2025.

2.2.4.2 Draft Guidelines

DoEHLG Wind Energy Guidelines 2006 (Revisions)

Further to the noted in Section 2.4.4.2 it should be acknowledged that the Department of the Environment, Community and Local Government published proposed revisions to the guidelines in December 2013 as part of a targeted review relating to Noise, Proximity and Shadow Flicker for discussion. Revisions to the Wind Energy Guidelines continue to be considered and draft revisions were published in December 2019, these are further discussed below.

Draft Revised Wind Energy Development Guidelines, December 2019

The Department of Housing, Planning and Local Government published the *Draft Wind Energy Guidelines* (referred to as the Draft Revised Guidelines) in December 2019 and these Draft Guidelines were under public consultation until 19th February 2020. Following the previous 2013 consultation and subsequent detailed engagement between the relevant Government Departments, a "preferred draft approach" to inform and advance the conclusion of the review of the 2006 guidelines was announced in June 2017.

In line with the previously stated "preferred draft approach", the 2019 Draft Guidelines primarily focus on addressing a number of key aspects including, but not limited to:

1. *Acceptable noise thresholds and monitoring frameworks;*
2. *Visual amenity setback and spacing;*
3. *Control of shadow flicker;*
4. *Compliance with Community consultation and dividend requirements, as included within the obligatory Community Report; and,*
5. *Consideration of the siting, route and design of the proposed grid connection as part of the whole project.*

2.3 Planning History

This Section of the EIAR sets out the relevant planning history of the Proposed Development site, planning applications in the vicinity of the site and other wind energy applications within the wider area. The period adopted for the purposes of this search is from 2017 – 2022, adopting the approach that any development permitted prior to that period has been constructed and forms part of the baseline. For the purposes of reviewing and stating the relevant planning history for this project the following criteria have been adopted in relation to the various elements of the Proposed Development:

1. *All planning applications which overlap or are within the red line planning application boundary of the current Proposed Development have been identified (listed in Table 2-1 below).*
2. *A buffer zone of 20 kilometres was established from the redline application boundary of the Proposed Development in order to identify other wind farm sites in the wider area. For the purposes of this EIAR the planning history was extended to this wide range for wind farm developments due to the nature of the projects, potential for visual and cumulative affects to arise with the Proposed Development as identified in Chapter 13: Landscape and Visual Assessment (Listed in Table 2-3).*
3. *A buffer zone of 2km was established from the planning application boundary of the Proposed Development to identify other planning applications made within the last 5 years not related to wind energy developments and is set out in Appendix 2-1. The planning history period is based on the assumption that any permitted development prior to that date has been constructed and therefore forms part of the baseline.*

2.3.1 Applications within the Site

2.3.2 Applications within the Site

Planning applications which are recorded as being within the application redline boundary are set out in Table 2-1 below. Planning permission was first granted by Sligo County Council in 2003 (Pl. Ref. 03/619). This permission was subsequently appealed to An Bord Pleanála (ABP Pl. Ref. 21.204790), which upheld the decision to grant and issued planning permission for the wind farm in March 2004. The Dunneill Wind Farm is operational and has been since 2010. The wind farm has been generating renewable electricity and supplying to the national grid over the last 11 years.

Table 2-1: Applications within the Application Site

Pl.Ref	Description	Decision
03/619	a) development of a wind farm including 13 no. three bladed wind turbines, with hub height of up to 49 metres and blade height of up to 52 metres, overall tip height of up to 75 metres; two road entrances, turbine and crane hardstands, construction of internal access roads and widening of existing tracks, two refuelling/maintenance areas with concrete surfaces and oil interceptors, single storey control building and associated site works including drainage, electrical and communication cabling (underground), 1 no. lattice-type permanent wind measurement/anemometer mast of 50 metres height and all associated and ancillary works; (b) temporary planning permission of 3 years duration for 2 no. pole type temporary wind measurement/anemometer masts of 40 metres height	Granted by Sligo CC. Granted by An Bord Pleanála (ABP Pl. Ref. 21.204790) 03/03/2004.
08/536	Retention of the existing 30-metre high telecommunications support structure carrying 4 No. antennas and 1 No. link dish together with associated equipment container, security fence and access track.	Granted by Sligo CC 08/10/2008

10/371	Retention of a Control Building of 97sqm with adjacent fenced compound and associated services on a site area of 0.07ha. This application for retention of planning will operate for the duration of the original planning permission granted under PL 03/619	Granted by Sligo CC 07/01/2011
10/388	Retention and operation of the existing temporary meteorological mast with associated site works. The temporary mast has a finished height above existing ground level of 49m approximately and consists of a lattice tubular frame fixed to a concrete base. This planning application for retention of the existing temporary meteorological mast as a permanent meteorological mast is to retain & operate the structure for the duration of the original planning permission as issued for the windfarm development Ref: PL03/619 at Dunneill Wind Farm	Granted by Sligo CC 20/01/2011

2.3.3 Wind Energy Applications within 20km Site Radius

The planning history of other relevant wind farm developments in the general vicinity of the Proposed Development are listed below, where there are ancillary applications related to renewable energy, details of these have also been provided in the interests of completeness. The wind farm development applications listed below are all within a 20-kilometre radius of the site of the current proposal.

Table 2-2 Wind Energy Applications within 20km of the Development Site

Pl.Ref	Description	Decision and Operational status
Kingsmountain Wind Farm – Fully constructed and operational		
97/469	The erection of a wind farm including 10 wind turbines (1.5mw/each) with 3.75m wide access road and electrical sub-station on revised site	Granted by Sligo CC 11/05/1999. Fully constructed and operational.
02/846	Alterations to previously permitted development under PL 97/469 involving an amendment to Condition No. 1(c) of this permission to locate transformers external to the 10 no. permitted turbines	Granted by Sligo CC 14/02/2003
Black Lough Wind Farm - Fully constructed and operational		
11/379	Ten year planning permission for the erection of an electricity generating windfarm consisting of four (4) wind turbines of hub height up to 65m and rotor diameter up to 71m, hardstandings, Electrical Control Building, 4 car park spaces, associated site roads, drainage and site works. The planning application is accompanied by an Environmental Impact Statement (EIS) and Natura Impact Statement (NIS)	Granted by Sligo CC. Granted by An Bord Pleanála (ABP Pl. Ref. PL21A.241637) 10/09/2013.
16/422	Development of a grid connection from the permitted windfarm at Tawnamore, Co. Sligo (Ref: PL 21.241637) to the Sligo/Mayo county boundary on County Road L-2604-39. The development will consist of a 20kv grid connection cable extending to circa 10.4 kilometres as described below and an electricity control room in the townland of Cloonkeelaun, Co. Sligo. The grid cable will consist of a circa 2.52 kilometre section of overhead line on six-metre high wooden poles in the townlands of Cloonkeelaun, Tawnalaughta and Carns, Co. Sligo and traverse underground for circa 7.89 kilometres through the townlands of Tawnamore,	Granted by Sligo CC 11/08/2017.

Pl.Ref	Description	Decision and Operational status
	Caltragh, Tawnalaghta, Cloonkeelaun and Carns, Co. Sligo. The development will also consist of underground connections, 485 metres long, from two wind turbines proposed under planning reference PL 15/466 to the electricity control room in the townland of Cloonkeelaun, Co. Sligo. A concurrent planning application will be submitted to Mayo County Council for an underground grid connection from the Sligo/Mayo county boundary to the Glenree ESB substation, Bonniconlon, Co. Mayo.	
16/822	Development of a 20kv underground grid connection cable extending to circa 6.43km to serve a permitted wind farm at Tawnamore, Co. Sligo (Ref No. PL21.241637). The underground cable will be developed from the Mayo/Sligo County Boundary at Carrowleagh to the Glencree ESB Substation Bonnyconlon and traverse the townlands of Carrowleagh, Carrownaglogh, Drumsheen and Bonnyconlon East.	Granted by Mayo CC 28/08/2017.
17/93	A ten year permission for development consisting of: (a) erection of four wind turbines with blade tip height of 124.33m (78.33m hub height, 92m rotor diameter) (b) cranage and assembly hardstand areas adjacent to each turbine (c) control room and parking spaces (d) cabling between each turbine (e) widening of existing access road and provision of new sections of access road to serve wind turbines (f) stilling ponds (g) peat reinstatement areas (h) replacement bridge across Gowlan River and realignment of approaches to the bridge (i) use of existing borrow pit and (j) all associated ancillary infrastructure. An Environmental Impact Statement (EIS) and a Natura Impact Statement (NIS) have been submitted with the application.	Granted by Sligo CC 03/06/2017.
19/160	For development consisting of an amendment to the permitted grid connection (Ref. No. PL16/422). The amended grid connection will be from the Black Lough Wind Farm at Tawnamore, Co. Sligo (Ref. No. PL17/93 to the permitted control building at Cloonkeelaun (Ref. No. PL 16/422), traversing the townlands of Tawnamore and Cloonkeelaun. The development will consist of a 20kv cable extending to (a) circa 2.3 kilometres of overhead line supported by a single wooden poles, (b) approximately 240m of underground cabling extending from turbine T2 at Black Lough to the first wooden pole and (c) approximately 100m of underground cabling from the southern-most pole of the proposed overhead line to the control building at Cloonkeelaun. An Environmental Impact Assessment Report (EIAR) and a Natura Impact Statement (NIS) will be submitted to the planning authority	Granted by Sligo CC 20/12/2019
20/228	For development consisting of amendment to planning permission PL17/93 for development of four wind turbines. The amendment application will consist of the	Granted by Sligo CC 21/10/2020.

Pl.Ref	Description	Decision and Operational status
	removal of condition 7(c) of planning permission PL17/93, which provided for the removal of the crane hard standings following erection of the turbines.	
Cloonkeelaun Wind Farm - Fully constructed and operational		
10/235	Erection of up to 3 no. wind turbines with 64 metre hub heights, rotor diameter 71m, 4.5m access roads, upgrading of existing roads, hard standings and all associated infrastructure forming an extension to the permitted Carrowleagh Wind Farm. This application is accompanied by an Environmental Impact Statement (EIS)	Granted by Sligo CC 02/12/2010.
14/196	Development consisting of the variation of Condition 2 of Planning Permission PL 10/235 to amend the duration of the planning permission from 20 years from the date of the planning permission order to 25 years from the date of commissioning in December 2012	Granted by Sligo CC 14/09/2014.
Cloonkeelaun Single Turbine - Fully constructed and operational		
15/343	For development consisting of a ten-year planning permission for the construction of a wind turbine with a tip height of up to 124.33 metres, site access road, hard standing area, underground cabling and all ancillary site works (to the northwest and adjacent to the existing Carrowleagh Wind Farm)	Granted by Sligo CC 28/12/2015.
Clonkeelaun Double Turbine - Fully constructed and operational		
15/466	Construction of two (2) wind turbines, each with a tip height of up to 124.33 metres, site access roads, hardstanding areas, underground cabling and all ancillary site works located (to the northwest and adjacent to the existing Carrowleagh Wind Farm) An EIS will be submitted with the application	Granted by Sligo CC 21/10/17.
Lackan Wind Farm – Fully constructed and operational		
02/816	Construction of 3 no. wind turbines, 60 metre hub height and 80 metre rotor diameter, access trackways, 4.5 metres in width, a substation building and associated site development works.	Granted by Sligo CC Granted by An Bord Pleanála (ABP Pl. Ref. 21.203388).
Carrowleagh Wind Farm - Fully constructed and operational		
06/3861	Construct a 29.9MW Wind Farm consisting of 13 No. Enercon E-70 2.3MW Turbines with an 64 Metre Hub Height, Rotor Diameter of 71 Metres, 4.5 Metre Access Roads to each turbine in addition to upgrade of existing roads hard standing at 20KV Substation building and temporary contractors compound.	Granted by Mayo CC 14/11/2007.
14/401	Variation of Condition 2 of Planning Permission P06/3861 to amend the duration of Planning Permission from 20 years from the date of commissioning to 25 years.	Granted by Mayo CC 28/10/2014
Bunnyconnellan Wind Farm - Fully constructed and operational		
10/514	27.6 Megawatt (MW) Wind Farm comprising 12 No. 2.3MW wind turbines, with steel towers and composite fibre rotor blades, of hub height up to 64 metres, a rotor diameter of up to 71 metres and base to blade tip height up to 99.55m. A substation control building with	Granted by Mayo CC Granted by An Bord Pleanála with revised conditions (ABP Pl. Ref. PL16.241506)

Pl.Ref	Description	Decision and Operational status
	fenced compound containing electrical equipment, wind turbine transformers, turbine hardstands, new access tracks, strengthening and widening of existing turbury tracks on site, drainage works, new entrance with realignment improvements for site access from regional road no. 294 undergrounded electrical cables linking the turbines with substation, undergrounded communication cables, all further associated site works and related ancillary development	13/12/2013.
Other Wind Farm Applications		

2.3.4 Applications within the Vicinity of the Wind Farm

There have been a number of planning applications (i.e., non-wind farm applications) lodged within the general setting of the existing Dunneill Wind Farm. The approach taken considers any permitted development within the last 5 years, the planning history period is based on the assumption that any permitted development prior to that date has been constructed and therefore forms part of the baseline. In general, the planning applications identified following a review of the Sligo County Council planning portal appear to be for the development of housing, agriculture and community facilities. The applications identified within 2km of the site are presented in Appendix 2-1.

2.4 Scoping and Consultations

2.4.1 Scoping

Scoping is the process of determining the content, depth and extent of topics to be covered in the environmental information to be submitted to a competent authority for projects that are subject to an Environmental Impact Assessment (EIA). This process is conducted by contacting the relevant authorities and Non-Governmental Organisations (NGOs) with interest in the specific aspects of the environment with the potential to be affected by the proposal. These organisations are invited to submit comments on the scope of the EIAR and the specific standards of information they require.

Comprehensive and timely scoping helps ensure that the EIAR refers to all relevant aspects of the Proposed Development and its potential effects on the environment and provides initial feedback in the early stages of the project, when alterations are more likely to be easily incorporated. In this way scoping not only informs the content and scope of the EIAR, but it also provides a feedback mechanism for the project proposal itself.

A Scoping Request was issued by MKO in relation to the Proposed Development on 16th June 2021. The Scoping Letter issued provided information on the topics below and is included in this EIAR as Appendix 2-2.

1. *Description of the Proposed Development Site*
2. *Project Background*
3. *Climate and Renewable Energy Policy*
4. *Designated Areas*
5. *Scope of the EIAR and Natura Impact Statement (NIS)*

2.4.2 Scoping Responses

Consultees to whom the scoping document were sent and the responses received to date are summarised in Table 2-3 and presented in Appendix 2-3. If further responses are received, the comments of the consultees will be considered in the operation of the Proposed Development, in the Consultees to whom the scoping document were sent and the responses received to date are summarised in Table 2-3 and presented in Appendix 2-3. If further responses are received, the comments of the consultees will be considered in the operation of the Proposed Development, in the event of a grant of planning permission. The recommendations of the consultees have informed the scope of the assessments undertaken and the contents of the EIAR.

Table 2-3 Scoping Responses

No.	Consultee	Response Date	Scoping Response
1	An Taisce	None received	No response
2	Bat Conservation Ireland	None received	No Response
3	BirdWatch Ireland	None received	No Response.
4	Broadcasting Authority of Ireland (BAI)	16/06/2021	The BAI confirmed by email that they are not aware of any issues from existing windfarms into existing FM networks. Also, the Proposed Development is not located close to any existing or planned FM transmission sites
5	Butterfly Conservation Ireland	None received	No Response
6	Commission for Regulation of Utilities (CRU)	None received	No Response
7	Department of Agriculture, Food and the Marine (DAFM)	29/06/2021	Response received noting the regulations around felling and requirements for a felling license. Also notes EIA requirement if necessary for proposed development
8	Department of the Environment, Climate and Communications (DECC)	None Received.	No Response. Please refer to Response from Inland Fisheries Ireland (IFI) and Geological Survey of Ireland (GSI) both of which are branches of the Department of the Environment Climate and Communications (DECC)
9	Department of Defence (DoD)	17/06/2021	Response received stating that the Department of Defence does not provide any observations or advice in the Pre- planning process, except where

No.	Consultee	Response Date	Scoping Response
			the relevant parties have been directed by a planning authority to seek the Department's views. The Minister for Defence reserves the right to comment on an actual planning application as and when it is submitted in accordance with the provisions of the planning regulatory code
10	Department of Tourism, Culture, Arts, Gaeltacht, Sport and Media	None received	No Response
11	Department of Transport (DOT)	23/06/2021	The DOT confirmed by email that they have no comment to make at this point in time but would appreciate being informed of any future relevant matters
12	Department of Housing, Local Government and Heritage	None received	No Response
14	Environmental Protection Agency (EPA)	None Received	No Response
15	ESB Telecoms	None Received	No Response
16	Eirgrid	None received	No Response
17	Fáilte Ireland	01/07/2021	Acknowledgement of receipt of scoping document and updated copy of Fáilte Ireland's Guidelines for the Treatment of Tourism in an EIA provided for the preparation of the Environmental Impact Assessment Report.
17	Geological Survey of Ireland (GSI)	14/07/2021	Response received from GSI indicating the following comments and observations; The Groundwater Data Viewer indicates two aquifers classed as a 'Poor Aquifer – Bedrock which is Generally Unproductive except for Local Zones', and a 'Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones' underlie the proposed extension. The Groundwater Vulnerability map indicates both 'High' and 'Extreme' groundwater vulnerability within the area covered. We would therefore

No.	Consultee	Response Date	Scoping Response
			recommend use of the Groundwater Viewer to identify areas of High to Extreme Vulnerability in your assessments, as any groundwater-surface water interactions that might occur would be greater in these areas. The Landslide Susceptibility viewer indicates the area is classed as variable, including areas of Moderately High to High landslide susceptibility. • Please refer to Chapter 8 – Land, Soils and Geology and Chapter 9 – Hydrology and Hydrogeology of the EIAR which includes details concerning groundwater and landslide susceptibility.
18	Health Service Executive	27/07/2021	Response from the HSE received regarding their general guidance to be considered in the preparation of an EIAR, in relation to impacts on Population and Human Health. • Please refer to Chapter 5 of the EIAR which includes details concerning Human Beings.
19	Inland Fisheries Ireland	29/06/2021	Response from Inland Fisheries Ireland received regarding their general guidance to be considered in the preparation of an EIAR in relation to impacts on the aquatic and associated riparian habitat. Please refer to Chapter 6 and Chapter 9 of the EIAR which contain details concerning Biodiversity and Hydrology & Hydrogeology respectively.
20	Irish Aviation Authority (IAA)	None received	No Response.
21	Irish Peatland Conservation Council	None received	No Response.
22	Irish Raptor Study Group	None received	No Response.
23	Irish Red Grouse Association	None received	No Response.
24	Irish Water	None received	No Response.

No.	Consultee	Response Date	Scoping Response
25	Irish Wildlife Trust	18/06/2021	Response from Irish Wildlife Trust stating that they do not have the capacity to consider or respond to all scoping requests at the moment but will endeavour to respond if possible.
26	Office of Public Works	None received	No Response.
27	Sligo County Council – Planning Department	22/06/2021	Response received from Sligo County Council Planning Department stating that they are satisfied that MKO team has the required level of expertise to act as Environmental Consultants with the responsibility to prepare the EIAR and carry out AA in relation to the proposed development and have no further comments or suggestions at this stage.
28	Sligo County Council – Environmental Department	None received	No Response.
29	Sligo County Council – Roads Department	None received	No Response.
30	Sligo County Council – Heritage Officer	None received	No Response
31	Sustainable Energy Authority of Ireland	None received	No Response.
32	The Heritage Council	None received	No Response.
33	Transport Infrastructure Ireland (TII)	24/06/2021	Response received from TII regarding their general guidance to be considered in the preparation of an EIAR, in relation to issues that may affect the national road network. • Please refer to Chapter 14 of the EIAR which includes details concerning traffic and transportation.
34	Waterways Ireland	None received	No Response.

2.4.3 Planning Consultation and Process

2.4.3.1 Pre-Planning Consultations with Sligo County Council

MKO, on behalf of the applicant Brickmount Ltd. a division of SSE Renewables (Ireland) Ltd. issued a pre-planning request to Sligo County Council on the 13th of July 2021, in respect of the proposed extension of operation to the existing Dunneill Wind Farm.

Sligo County Council Planning Department responded on the 30th of July 2021 stating that they do not feel the need for a formal pre-planning meeting and are satisfied with the consultation that had taken place with SSE in January and February 2021 and scoping letter sent in June 2021. In their response to the Scoping Letter received on the 22nd of June 2021, as outlined in Table 2-3 above, Sligo County Council stated that they are satisfied that MKO team has the required level of expertise to act as Environmental Consultants with the responsibility to prepare the EIAR and carry out AA in relation to the Proposed Development. Sligo County Council had no other comments or suggestions.

2.4.3.2 Community Consultations

As this is a long-established wind farm (in operation since 2010) it is well known by local people in the community. As this is an application to extend the life of the existing Dunneill Wind Farm and as no amendments are being proposed to the layout, SSE considered that community consultations should be tailored to reflect that context.

To date, community consultations consisted of a hand delivered letter drop made on 11th and 12th April 2022 to dwellings within 2km of the wind farm (The information leaflet and a cover letter was put in the letter box of people not home), advising of the forthcoming planning application to be made to Sligo County Council, a the letter has a dedicated email address vicky.boden@sse.com for general queries or observations. A copy of this information leaflet and letter is included as Appendix 2-4 to the EIAR. One to one meetings will be facilitated on request.

Information is also available on https://www.sserenewables.com/onshore-wind/ireland/dunneill/. The website shall have all planning related documents for this project. The website provides details as to how the public can submit general queries by either email, telephone or post. Further online public consultation shall be facilitated throughout the remainder of the planning process.

2.5 Cumulative Impact Assessment

The EIA Directive and associated guidance documents state that as well as considering any indirect, secondary, transboundary, short-, medium-, and long-term, permanent and temporary, positive and negative effects of the project (all of which are considered in the various chapters of this EIAR), the description of likely significant effects should include an assessment of cumulative impacts that may arise. The factors to be considered in relation to cumulative effects include population and human health, biodiversity, land, soil, water, air, climate, material assets, landscape, and cultural heritage as well as the interactions between these factors.

To gather a comprehensive view of cumulative impacts on these environmental considerations and to inform the EIAR process being undertaken by the consenting authority, each relevant chapter within this EIAR includes a cumulative impact assessment where appropriate.

The potential for cumulative impacts arising from other projects has therefore been fully considered within this EIAR.

2.5.1 Methodology for the Cumulative Assessment of Projects

To gather a comprehensive view of cumulative impacts on the above environmental considerations and to inform the EIA process being undertaken by the consenting authority, each relevant chapter within the EIAR addresses the potential for cumulative effects to arise.

The potential cumulative impact of the proposed and other relevant developments has been carried out with the purpose of identifying what likely significant effect the proposed development will have on the surrounding environment when considered cumulatively and in combination with relevant permitted, proposed, and constructed projects in the vicinity of the Proposed Development.

The cumulative impact assessment of projects has three principle aims:

- To establish the range and nature of existing projects within the cumulative impact study area of the proposed development.
- To summarise the relevant projects which have a potential to create cumulative impacts.
- To identify the projects that hold the potential for cumulative interaction within the context of the proposed development and discard projects that will neither directly or indirectly contribute to cumulative impacts.

Assessment material for this cumulative impact assessment was compiled on the relevant developments within the vicinity of the Proposed Development. The material was gathered through a search of relevant online Planning Registers, reviews of relevant EIAR (or historical EIS) documents, planning application details and planning drawings, and served to identify past and future projects, their activities and their environmental impacts.

2.5.2 Projects Considered in Cumulative Assessment

The projects considered in relation to the potential for cumulative impacts arising from construction, operational and decommissioning phases of the proposed development and for which all relevant data was reviewed include those listed below.

2.5.2.1 Other Wind Turbines

A buffer zone of 20 kilometres was established from the redline application boundary of the Proposed Development in order to identify other wind farm sites in the wider area. For the purposes of this EIAR the planning history was extended to this wide range for wind farm developments due to the nature of the projects, potential for visual and cumulative affects to arise with the Proposed Development as identified in Chapter 12: Landscape and Visual Assessment There are a number of other wind farm developments located within a 20-kilometre radius of the proposed development site. The other wind farm developments have been listed and included under Section 2.5.2 of this chapter of the EIAR. The other wind farm developments have been considered under the overall cumulative assessment of the proposed development. Any cumulative affects arising are considered in the relevant chapters of this EIAR.

2.5.2.2 Other Developments/Land-Uses

The review of the Sligo County Council planning register documents relevant general development planning applications in the vicinity of the existing wind farm, most of which relate to the provision and/or alteration of housing and agriculture-related structures as described under Appendix 2-1. These applications have also been taken into account in describing the baseline environment and in the relevant assessments.

Furthermore, the cumulative impact assessments carried out in each of the subsequent chapters of this EIAR consider all potential significant cumulative effects arising from all land uses in the vicinity of the Proposed Development. Overall, the Proposed Development has been designed to mitigate impacts on the environment and particularly water, and a suite of mitigation measures is set out within the EIAR. The mitigation measures set out in this EIAR have been developed to ensure that significant cumulative affects do not arise during the continued operational or decommissioning phases of the Proposed Development. Additional detail in relation to the potential significant cumulative effects arising and, where appropriate, the specific suite of relevant mitigation measures proposed are set out within each of the relevant chapters of this EIAR.

3. CONSIDERATION OF REASONABLE ALTERNATIVES

3.1 Introduction

Article 5(1)(d) of Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (codification) as amended by Directive 2014/52/EU (the EIA Directive) requires that the Environmental Impact Assessment Report (EIAR) prepared by the developer contains *"a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment."*

Article 5(1)(f) of the EIA Directive requires that the EIAR contains *"any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected."*

Annex IV of the EIA Directive states that the information provided in an EIAR should include a *"description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects."*

This section of the EIAR contains a description of the reasonable alternatives that were studied by the developer, which are relevant to the proposed project and its specific characteristics, in terms of site location and other renewable energy technologies as well as site layout incorporating size and scale of the project, connection to the national grid and transport route options to the site. This section also outlines the design considerations in relation to the wind farm, including the associated substation. It provides an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.

The consideration of alternatives is an effective means of avoiding environmental impacts. As set out in the *'Guidelines on The Information to be Contained in Environmental Impact Assessment Reports* (Environmental Protection Agency, 2022), the presentation and consideration of reasonable alternatives investigated is an important part of the overall EIA process.

It is important to re-iterate that the Dunneill Wind Farm is an existing wind farm, first commissioned in 2010, and this EIAR is being prepared in support of a planning application to extend the operational lifespan of the wind farm beyond 2024, by a further 15 years (the Proposed Development).

Hierarchy

EIA is concerned with projects. The Environmental Protection Agency (EPA) 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, May 2022), state that in some instances neither the applicant nor the competent authority can be realistically expected to examine options that have already been previously determined by a higher authority, such as a national plan, or regional programme for infrastructure, which are examined by means of a Strategic Environmental Assessment (SEA), the higher tier form of environmental assessment.

Non-environmental Factors

EIA is confined to the potential significant environmental effects that influence consideration of alternatives. However, other non-environmental factors may have equal or overriding importance to the developer of a project, for example project economics, land availability, engineering feasibility or planning considerations.

Site-specific Issues

The EPA guidelines state that the consideration of alternatives also needs to be set within the parameters of the availability of the land, i.e., the site may be the only suitable land available to the developer, or the need for the project to accommodate demands or opportunities that are site-specific. Such considerations should be on the basis of alternatives within a site, for example design and layout.

3.1.2 Methodology

The European Commission's *Guidance on the Preparation of the Environmental Impact Assessment Report* (EU, 2017) outlines the requirements of the EIA Directive and states that, in order to address the assessment of reasonable alternatives, the developer needs to provide the following:

- A description of the reasonable alternatives studied; and,
- An indication of the main reasons for selecting the chosen option with regards to their environmental impacts.

There is limited European and National guidance on what constitutes a 'reasonable alternative' however the EU Guidance Document (EU, 2017) states that reasonable alternatives "*must be relevant to the proposed project and its specific characteristics, and resources should only be spent assessing these alternatives*".

The guidance also acknowledges that "*the selection of alternatives is limited in terms of feasibility. On the one hand, an alternative should not be ruled out simply because it would cause inconvenience or cost to the Developer. At the same time, if an alternative is very expensive or technically or legally difficult, it would be unreasonable to consider it to be a feasible alternative*".

The current EPA Guidelines (EPA, 2022) state that *"It is generally sufficient to provide a broad description of each main alternative and the key issues associated with each, showing how environmental considerations were taken into account in deciding on the selected option. A detailed assessment (or 'mini-EIA') of each alternative is not required."*

Consequently, taking consideration of the legislation and guidance requirements into account, this section addresses alternatives under the following headings:

- 'Do Nothing' Alternative;
- Alternative Locations;
- Alternative Processes;
- Alternative Technologies;
- Alternative Turbine Layouts and Development Design; and,
- Alternative Mitigation Measures.

Each of these is addressed in the following sub-sections.

When considering a wind farm development, given the intrinsic link between layout and design, the two will be considered together in this chapter.

3.2 'Do-Nothing' Alternative

Article IV, Part 3 of the EIA Directive states that the EIAR should include *"an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge."* This is referred to as the "do-nothing" alternative. EU guidance (EU, 2017) states that this should involve the assessment of *"an outline of what is likely to happen to the environment should the Project not be implemented – the so-called 'do-nothing' scenario."*

An alternative land-use option to maintaining the existing wind energy development at the site would be to decommission the wind farm once the current planning permission expires (March 2024) and restore the site to its original use as agricultural lands for pasture and crops.

Condition 10 of the original Planning Application to Sligo County Council (SCC) (SCC Ref. PL03-619) states the following in relation to the decommissioning of the wind farm:

> *"Upon termination of the use of the wind farm, the mast and turbines shall be dismantled and removed from the site and the site shall be restored to its existing condition in consultation with the planning authority."*

In implementing the 'do-nothing' alternative, however, the opportunity to utilise the significant existing renewable energy infrastructure would be lost. So too would the opportunity to contribute to meeting Government and EU targets for the production and consumption of electricity from renewable resources and the reduction of greenhouse gas (GHG) emissions. The site currently has a generating capacity of c. 11 megawatts (MW) which can provide clean electricity to meet the needs of approximately 6,277 homes.

The opportunity to generate local employment, local authority development contributions, rates and investment in the local area would also be lost. The decommissioning of the existing wind farm as set out in the above planning condition may lead to environmental effects due to the potentially extensive groundworks required to remove existing turbine foundations, access roads, cabling and other subgrade elements. A more environmentally sensitive approach to decommissioning is outlined in Chapter 4, Section 4.8 of this EIAR.

On the basis of the positive environmental effects arising from the Proposed Development, when compared to the 'do-nothing' scenario, the 'do–nothing' scenario was not the chosen option.

It is noted that of the total current wind farm development lands (i.e., EIAR Study Area = approximately 66 hectares [ha]), the development footprint accounts for approximately 2.8 ha, or 4.2% of the total area. The remainder of the site is currently either used for commercial forestry and rough grazing. The existing commercial and agricultural uses can, and will, continue in conjunction with this proposed use of the development site.

A comparison of the potential environmental effects of the 'Do-Nothing' Alternative when compared against the chosen option of developing a renewable energy project at this site are presented in Table 3-1 below.

Table 3-1 Comparison of environmental effects when compared against the chosen option (maintaining the existing wind farm at this site)

Environmental Consideration	'Do-Nothing' Alternative
Population and Human Health (including Shadow Flicker)	Short-term increase in local employment due to decommissioning works, followed by long-term loss of local employment, and loss of long-term financial contributions towards the local community. Long-term loss of community recreational amenity (site roads/tracks currently used for walking/running). No potential for shadow flicker to affect sensitive receptors.
Biodiversity and Ornithology	Slight negative impact upon locally important habitat
Land, Soils and Geology	Neutral
Geotechnical	Neutral
Water	Short-term, slight negative impact upon local surface water quality.
Air and Climate	Will not provide the opportunity for an overall increase in air quality or reduction of greenhouse gases. Will not assist in achieving the renewable energy targets set out in the Climate Action Plan.
Noise and Vibration	Potential short-term, slight, negative noise impacts on nearby sensitive receptors.
Landscape and Visual	No landscape and visual effects related to the turbines, once removed.
Cultural Heritage and Archaeology	Slight potential for long-term negative impacts on recorded monuments and subsurface archaeology.
Material Assets	Likely greater traffic volumes during decommissioning phase. Potential generation of significant quantities of construction and demolition (C&D) waste.

3.3 Alternative Locations

3.3.1 Site Selection Process

It is considered appropriate to extend the operational phase of the existing wind energy development at the current site for the following reasons:

- Dunneill Wind Farm has been operated successfully at its current location since 2010, when it was first commissioned. It has proven to have reliably good wind speeds and maintained a good generating capacity.
- While the turbine technology on the site is dated, it has been demonstrated by Brickmount Ltd., who are a wholly owned subsidiary company of SSE Renewables (Ireland) Limited (SSE), that the existing 13 no. Vestas V52 850 kilowatt (kW) model turbines can continue to operate efficiently for a further 15 years without a significant loss in the total generating capacity of 11 megawatts (MW). As outlined in Chapter 1 of this EIAR, the existing Dunneill Wind Farm is set to be decommissioned in March 2024 under the current planning permission. The turbines will have only been in operation for 14 years by March 2024, which is several years below their operational expectancy. SSE have provided details of technical feasibility assessments undertaken concerning the lifetime extension of the Dunneill Wind Farm turbines. SSE concluded based on the results of these assessments that the existing turbines at the wind farm have the ability to operate for an additional 15 years. A letter from SSE outlining the findings of these performance assessments in included as Appendix 3-1 to this report.
- The existing wind farm infrastructure on the site, including the control building, site roads and met mast, can continue to be used for the extended operational period, which reduces environmental effects when compared to an undeveloped greenfield site, particularly in relation to landscape and visual effects and effects on locally important habitats.
- The existing wind farm site entrances can continue to be used without any alterations or road works required.
- The Proposed Development can comply with the policies and principles outlined in Chapter 1: Introduction (of this EIAR) in terms of the need for additional renewable energy in Ireland.
- SSE has collected a significant amount of site-specific data relating to the characteristics of the site and the local area, and this information was used during the development's operational review process, in particular in considering the feasibility of alternative renewable technologies, such as solar energy.
- The Proposed Development can contribute to the achievement of national energy targets and can continue to provide significant social and economic benefits for the local area (direct and indirect employment, community development fund, recreational amenity) and the wider region.
- Repowering of the existing site (replacement of old turbines with new turbines to increase generating capacity) would likely require the use of a smaller number of significantly larger turbines. Repowering of the site with considerably larger turbines was not deemed feasible due to existing site constraints, primarily the close proximity of existing residential dwellings to the site, and therefore increased potential impacts from noise, shadow flicker and landscape and visual impacts.
- Having been previously permitted under SCC Ref. PL03-619 the principle for wind energy development at this site is already well established and has been proven to be in accordance with the proper planning and sustainable development of the area. Chapter 2, Section 2.4 of this EIAR outlines the strategic planning context and provides further details of the Proposed Development's alignment with national, regional, and local policies, frameworks, guidelines and plans.

3.3.2 Review of Alternative Sites

SSE have undertaken a review of their operational wind farm portfolio on sites approaching 20 years of operation with a view to determining if they should be decommissioned, the operational life extended, or if they were suitable for repowering. It was then decided which of the sites should be taken forward for extension of operation first.

The existing Dunneill Wind Farm was considered suitable for extension of operation due to the success of the existing site, the good condition and performance of the existing turbines and site infrastructure (see Appendix 3-1 for turbine performance assessment details), the wind regime on the site and the existing grid connection infrastructure. The turbines at Dunneill Wind Farm have only been operational since 2010, and so are still in good operational condition as the lifespan for turbines of this kind is projected to be 25-30 years.

The existing wind farm development lands are owned by a single landowner, with SSE using these lands for the wind farm under a long-term lease agreement. The Proposed Development is for an extension of life of the operational Dunneill Wind Farm and therefore, further detailed assessment of alternative locations is not considered to be applicable in this instance.

3.3.3 Sustainability Strategy

The current vision of SSE Renewables is to be a leading energy company in a net zero world. In order to achieve this, the strategy they have set out involves creating value for shareholders and society in a sustainable way by developing, building, operating and investing in the electricity infrastructure and businesses needed in the transition to net zero. SSE state that sustainability is one of the core values, and defines it as doing things 'responsibly to add long-term value'. SSE aim to be operating at net zero by 2050 and have set four 2030 business goals aligned with the UN's Sustainable Development Goals (SDGs) on the road to net zero.

Key goals under this net-zero approach include:

- Cut carbon intensity by 80%;
- Increase renewable energy output fivefold;
- Enable low carbon generation and demand;
- Champion a fair and just energy transition.

Onshore wind projects, such as the Dunneill Wind Farm, are therefore viewed as critical infrastructure supporting SSE's stated transition to renewables. Currently, SSE's onshore wind asset portfolio has a generation capacity of approximately 2GW throughout Ireland and the UK.

SSE's strategy is in line with the National policies such as the Climate Action Plan 2021, for example in terms of reducing carbon dioxide equivalent (CO_2 eq.) emissions from the energy sector and cut carbon intensity by committing to a renewably energy electricity target of up to 80% by 2030.

3.4 Alternative Processes

The management of processes that affect the volumes and characteristics of emissions, residues, traffic and the use of natural resources has formed part of the alternative's considerations through the development of the proposed extension of operation of the existing wind farm development.

During the operational phase the processes required at the site are relatively benign. There are no manufacturing processes per se with the potential for the generation of significant emissions to any environmental media, the use of finite natural resources or the generation of wastes or traffic volumes.

On this basis, alternative processes designed to reduce emissions and use of resources during the operational stage are not required.

The limited operation and maintenance (O&M) activities required at the site will require the use of relatively low levels of raw materials in the form of energy to supply plant and machinery, standard building materials including stone, metals, pipework, concrete, electrical and plumbing. Raw materials are also utilised in the manufacture of wind turbine components and electrical infrastructure that may require replacement. The use of these resources will be controlled by the employment of best practice O&M techniques including waste management practices.

The purpose of the Proposed Development is to generate electricity from an infinite renewable source which will offset the use of finite fossil fuels. The baseline scenario without implementation of the Proposed Development is to not provide a renewable energy source at this eminently suitable location, therefore failing to contribute to climate change and energy policy objectives. Such an approach would neither be optimal nor appropriate.

3.5 Alternative Technologies

The current site is developed as a wind farm capable of generating up to c. 11 MW of renewable energy. The Proposed Development, through extending the operational lifespan of the wind farm, will maintain this level of renewable energy generation with little additional capital investment required and no significant increases in operating costs.

The existing site could potentially be redeveloped with an alternative renewable energy technology, with a solar photovoltaic (PV) array, or a solar / wind energy mix deemed the most suitable to this location.

Redevelopment of the site as a large-scale solar farm capable of generating enough energy to be economically viable would drastically change the existing character of the land, as it would have a significantly larger footprint, and therefore greatly reduce the area currently available for agricultural use. According to the Sustainable Energy Authority of Ireland (SEAI) approximately 1.6 - 2.0ha of a solar array area is required for each megawatt generated. Therefore, in order for a solar farm to deliver at least 11 MW (current wind farm generating capacity) a footprint area of approximately 17.6 – 22 ha of solar array would be required. The current wind farm turbine footprint in comparison (turbines and hardstanding areas) is approximately 1.14ha.

There are also existing environmental site constraints which would severely limit potential for solar development at the site. To achieve the same energy output from solar energy, the site would require a significantly larger development footprint. In addition, a solar development would have a higher potential environmental effect on Hydrology & Hydrogeology, Traffic & Transport (construction phase) and Biodiversity (habitat loss) at the site, due to the requirement for land. The amount of land available at the site is not sufficient to support a solar development of this scale. Furthermore, a potential solar development at the site would also require large areas of forestry felling to accommodate the additional land requirement. The Dunneill Wind Farm is located in the northwest of Ireland in County Sligo. Met Eireann weather data at the site shows the sun shines on average for only 24% of the daylight hours during the year, which is suboptimal for solar.

Given the existing site constraints, significant capital investment required in order to redevelop the current wind farm site as a solar farm, the increased development footprint, and the ability of the existing wind turbines to perform for a further 15 years, it was not deemed suitable to further pursue this alternative land use option.

Table 3-2 Comparison of environmental effects when compared against the chosen option (maintaining use of wind turbines)

Environmental Consideration	Solar PV Array (with an 11MW output)
Population and Human Health (incl. Shadow Flicker)	No potential for shadow flicker to affect sensitive receptors. Potential for glint and glare impacts to local residents and road users.
Biodiversity and Ornithology	Larger development footprint would result in greater habitat loss. Potential for 'lake effect' impacts on birds (birds may perceive solar arrays as a lake and attempt to land on panels).
Land, Soils and Geology	Conversion of site to a solar farm would result in greater levels of disturbance to soils and geology in order to develop new site infrastructure suitable to a solar farm.
Geotechnical	Shallower excavations involved in solar PV array developments. Neutral impact due to relatively level site topography and shallow underlying granite bedrock suitable as foundation anchor.
Water	Larger development footprint, therefore, increasing the potential for silt laden runoff to enter receiving watercourses. Large-scale solar PV array has the potential to alter drainage patterns in the immediate vicinity.
Air and Climate	Reduced capacity factor of solar PV array technology would result in a longer carbon payback period.
Noise and Vibration	No potential for noise impacts on nearby sensitive receptors during operational phase. Increased potential for noise impacts on nearby sensitive receptors during construction phase of a new solar farm.
Landscape and Visual	Potentially less visible from surrounding area due to screening from vegetation and topography. Alters landscape character and potential negative effect on mountain views.
Cultural Heritage and Archaeology	Potential for negative effects on cultural heritage sites due to larger development footprint of solar.
Material Assets	Potential for greater traffic volumes during construction phase due to larger development footprint and requirement for more construction materials.

3.6 Alternative Turbine Layouts and Development Design – Repowering Option

The Proposed Development consisting of 13 no. wind turbines will each have a potential power output of 850kW delivering a total generating capacity of up to 11.0MW. It is proposed to extend the operational lifespan of the 13 existing turbines of 75m blade tip-height at the site. A similar generating capacity could also be achieved on the existing site by using significantly larger turbine technology (for example 2.5MW machines). This would necessitate the installation of at least 5 new turbines of approximately 125m total height to achieve a similar output.

The use of significantly larger turbines at the site, while likely to reduce the development footprint, would be problematic in terms of potential negative noise impacts, shadow flicker, ornithology/biodiversity impacts, and landscape and visual impacts to the surrounding residential receptors.

Adopting a smaller number of larger turbines at the existing site may be challenging to achieve in line with the current Wind Energy Guidelines (2006), particularly as several residential dwellings have been constructed in close proximity to the wind farm since it was first developed.

The construction of larger turbines at the site would necessitate significant road upgrades and potential realignments, in order to accommodate delivery of larger turbine components, increasing the potential for negative environmental impacts to occur on biodiversity, hydrology and traffic and transportation.

Furthermore, the increased use of materials, new foundation excavations, movement of excavated materials and increased visual impacts associated with significantly larger turbines (up to 125m in height) would result in a higher level of negative environmental effects than the proposed option (extension of existing wind farm operation).

It should be noted that no alterations to the pre-existing turbine model installed on the site is proposed as part of this application. The maximum height of the turbines is 75m when measured from ground level to blade tip. For the purposes of this EIAR this is the turbine size which has been assessed (e.g., existing turbine dimensions used for visual impact, shadow flicker etc.). The EIAR therefore provides a robust and accurate assessment of the turbines considered within the overall development description.

A comparison of the potential environmental effects of the installation of a smaller number of larger wind turbines when compared against the chosen option of maintaining a larger number of smaller wind turbines are presented in Table 3-3 below.

Table 3-3 Comparison of environmental effects when compared against the chosen option (smaller wind turbines)

Environmental Consideration	Smaller Number of Larger Turbine Models
Population and Human Health (incl. Shadow Flicker)	Greater potential for shadow flicker impacts on nearby sensitive receptors due to the increased height and overall size of turbines.
Biodiversity and Ornithology	Likely impacts from construction (excavations, rock-breaking, increased traffic volumes) required to install larger turbines on the site present an increased potential to negatively impact biodiversity due to disturbance and displacement effects. The development footprint would likely be similar in size due to the requirement to space larger turbines further apart from one another and increased foundation size and hardstanding areas. Habitat loss of fewer number of larger turbines is likely to be neutral. There is a greater potential collision risk for birds due to the presence of turbines up to 60% higher than those currently existing, typically encompassing a larger blade length and swept area.
Land, Soils and Geology	Larger development footprint would result in greater volumes of soil/rock/spoil to be excavated and managed.
Geotechnical	Neutral impact due to relatively level site topography and shallow underlying granite bedrock suitable as foundation anchor.
Water	Larger development footprint, therefore, increasing the potential for silt laden runoff to enter receiving watercourses.
Air and Climate	Increased potential for vehicle emissions and dust emissions due to an increased volume of construction material and turbine component deliveries to the site.
Noise and Vibration	Potential for increased noise impacts on nearby sensitive receptors due to reduced separation distance between residential dwellings and turbine locations.
Landscape and Visual	Although a smaller number of turbines would be present, the significantly greater turbine height would have a greater landscape and visual impact.
Cultural Heritage and Archaeology	Larger development footprint likely to increase the potential for impacts on recorded monuments, and also upon any unrecorded, subsurface archaeology.
Material Assets	Potential for greater traffic volumes during construction phase due to larger development footprint and requirement for more construction materials and turbine components.

3.6.1 Location of Ancillary Structures

The ancillary infrastructure required for the operation of the Proposed Development includes a control building, associated grid connection (underground cable and overhead line) and meteorological mast. No alterations are proposed to the locations of the existing site structures, as detailed in Chapter 4: Description of the Proposed Development and Figure 4-1. These structures were initially situated based upon the constraints of the site when first developed in 2010, and these have not changed significantly in the intervening period.

It should be noted that the existing underground grid connection from Dunneill Wind Farm to the Cunghill 110kV substation approximately 20km southeast, does not form part of this EIAR, other than its inclusion as a project considered cumulatively, as detailed in Chapter 4, Section 4.1 of this report.

3.6.1.1 Control Building

The existing wind farm control building is located southwest of turbine T10 and northeast of T11. The control building is accompanied by a parking area and a walkway perimeter. The control building is built on a hardstanding area of 18.7 x 10 meters.

The selection of the location of the on-site control building with associated development footprint has had regard to the constraints of the site, such as proximity to the

The selection of the location of the onsite electrical control building and welfare facilities with associated development footprint of approximately 455m^2 had regard to the constraints of the site, such as proximity to the existing road network, location of nearest grid connection point, location of protected habitats, and limiting visual and landscape impacts. Ease of access and ensuring a suitable setback from turbine locations was also taken into consideration.

It should also be noted that while the extended operational lifespan of the Proposed Development is expected to be 15 years, the onsite 20kV substation and associated grid connection does not form part of the Proposed Development and will remain a permanent feature and asset to the national grid and electrical infrastructure of the area, in the event of the remainder of the site being decommissioned.

Due to the significant capital costs required to alter the pre-existing control building location (and associated cabling and related infrastructure) alternative locations were not considered feasible by SSE and have not been further assessed as part of the Proposed Development. No concerns (current or future) regarding the impact of the current control building location were identified.

3.7 Alternative Mitigation Measures

Mitigation by avoidance has been a key aspect of the Proposed Development's evolution through the selection and design process. Avoidance of the most ecologically sensitive areas of the site, any areas of the site potentially prone to flooding, as well as avoidance of existing archaeological monuments, limits the potential for environmental effects on these receptors. The Proposed Development will not involve disturbance or loss of existing habitat, and the Applicant has confirmed a number of biodiversity enhancement initiatives are planned and will continue at Dunneill, such as implementing pollinator-friendly management practices, in line with the recent Wind Energy Ireland's pollinator guidance document[1]. This will likely lead to an overall increase in available local habitat and species diversity. Furthermore, an apiary is provided on site at Dunneill, and annual contributions are made to Mayo Beekeepers Association Subgroup – Dromore West Beekeepers as outlined in Appendix 2-4 of this EIAR. An alternative to this pollinator-friendly management practices approach is to continue with

[1] *Wind Energy Ireland (2021) Pollinator-friendly management of Wind Farms, National Biodiversity Data Series No. 25.*

standard agricultural and commercial forestry practices and encroach on the environmentally sensitive areas of the site and accept the potential environmental effects and risk associated with this.

The detailed ornithological assessment provided in Chapter 7 of this report, concluded that the extended operation of the existing wind farm is unlikely to cause a significant effect on bird species. For this reason, no additional bird monitoring or secondary mitigation measures e.g., shutting down turbine operation at key times of the year, were considered to be required.

Due to the nature of the Proposed Development (existing wind farm with no construction works, groundworks or significant land-use change proposed), the greatest potential for environmental effects exists during the operational phase. During the operational phase there are no significant ongoing emissions to any environmental media (water, air, soil etc.) and the general environmental risk associated with the existing infrastructure is low. Further alternative mitigation measures for this phase are therefore not necessary for further consideration, in most instances.

The best practice design and mitigation measures set out in this EIAR will contribute to reducing any risks and have been designed to break the pathway between the site and any identified environmental receptors. The alternative is to either not propose these measures or propose measures which are not best practice and effective, and neither of these options are sustainable.

4. DESCRIPTION OF THE PROPOSED DEVELOPMENT

4.1 Introduction

This section of the Environmental Impact Assessment Report (EIAR) describes the Proposed Development and its component parts which is the subject of a proposed application to Sligo County Council to extend the operational period of the existing Dunneill Wind Farm for an additional 15 years.

The application seeks a fifteen (15) year planning permission for continuation of the operational life of the existing wind farm (SCC Reg. Ref. 03/619 & ABP Pl. Ref. 21.204790, as amended by SCC Reg. Ref 10/371 and 10/388) from the date of expiration (March 2024) of the current permissions. No modifications are proposed to the existing windfarm which comprises the following elements:

a) *13 no. existing Vestas V52 850 kilowatt (kW) wind turbines with a maximum overall blade tip height of 75 metres (m).*
b) *Existing 1 no. onsite 20 kilovolt (kV) electrical substation compound which includes a control building, welfare facilities, associated electrical plant and equipment, security fencing, associated underground cabling and a foul waste holding tank.*
c) *Existing 1 no. permanent meteorological mast with a height of 50m and an associated concrete platform/base;*
d) *All associated existing underground electrical and communications cabling connecting the turbines to the on-site substation;*
e) *Existing site access tracks of circa 3.3 kilometres (km) total length, 3 no. car parking spaces and 13 no. turbine hardstands;*
f) *2 No. existing gated site entrances from an unnamed third-class public road which dissects the windfarm site into north and south;*
g) *Existing Site drainage; and,*
h) *All existing ancillary infrastructure, associated site fencing and signage.*

All elements of the existing wind farm as described in this chapter, as described above, have been assessed as part of this EIAR. All elements of the project are pre-existing and it is not proposed to make any alterations to the current site layout, wind turbines or associated infrastructure. All elements of the existing wind farm were constructed in accordance with the conditions attached to the planning permission for Dunneill Wind Farm and ESB/EirGrid specifications and requirements at the time of construction.

The grid connection does not form part of the existing Dunneill Wind Farm, as defined within the current An Bord Pleanála (ABP Pl. Ref. 21.204790) planning permission. Furthermore, the planning application for the wind farm's extension of operational period does not include the pre-existing connection to the national electricity grid. The 20kV grid connection from the onsite substation at Dunneill connects to the national grid via an underground cable to the existing 110kV Cunghill substation approximately 20km southeast of Dunneill. The planning background for Dunneill Wind Farm is detailed further in Chapter 2: Background to the Proposed Development. Although not included in this planning application, the grid connection is assessed cumulatively as part of this EIAR.

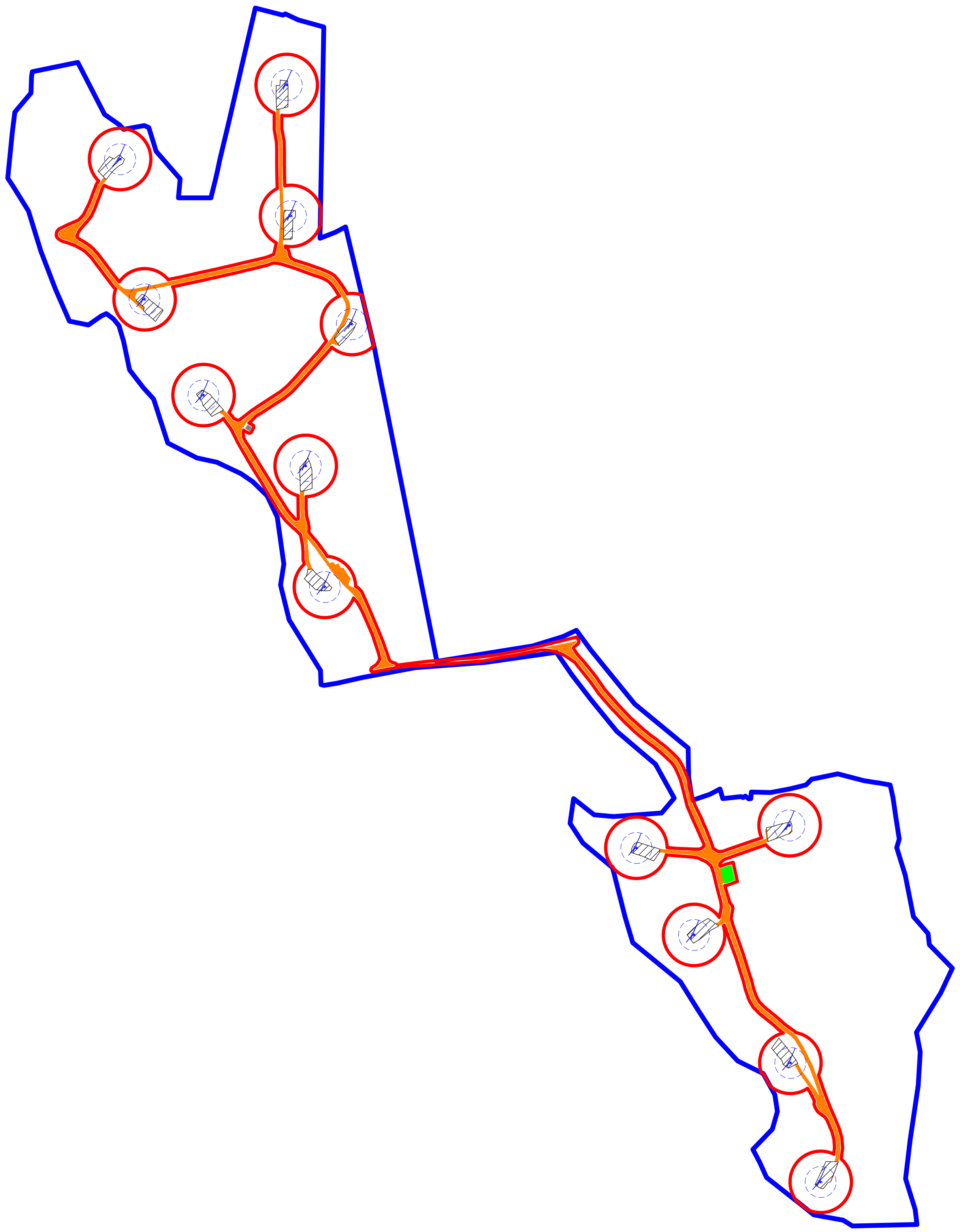
It is considered that any routine maintenance works required to the turbines and/or substation as part of the extended operation of the wind farm would be minor in nature and would not have any significant environmental effects. The planning permission for the wind farm was granted in 2004 for 20 years from the date of the grant. The current planning permission is therefore set to expire in March 2024. Condition No. 8 of Pl. Ref. 03/619 states that *"this permission is for a period of twenty years from the* *date of this order. The wind turbines including towers and blades shall then be removed unless, prior to the end of the period, planning permission shall have been granted for their retention for a further period".* By March 2024, the existing turbines will have been in operation for only 14 years, whereas the normal operational life of a turbine is 25 to 30 years. It is therefore intended to apply for planning permission to continue operation of the wind farm beyond the expiration of its current permission. The impact of Decommissioning in context of decommissioning in both 2024 under the current planning permission (Pl. Ref. 03/619) and under the scenario of a 2039 decommissioning date as part of the Proposed Development, are considered and described in Section 4.8 below.

4.2 Development Layout

The layout of the Proposed Development (the existing Dunneill Wind Farm) was originally designed to minimise the potential environmental effects of the wind farm, while at the same time maximising the energy yield of the wind resource passing over the site. The Dunneill site was chosen initially by Brickmount Ltd. as being particularly suited to a wind energy development due to the favourable conditions. High exposure and even terrain to the west enables high wind speed and low turbulence, with mean wind speeds recorded above 8 meters per second (m/s) at a height of 10m above ground level.

A constraints study carried out at the initial pre-planning stage (before the original wind farm planning application and EIS prepared in 2003), as outlined in Section 3.3.1 of this EIAR, was used to inform the design of the existing development, ensuring that turbines and ancillary infrastructure were located in the most appropriate areas of the site. The development layout was chosen so as to locate as much of the wind farm's footprint as possible within pre-existing commercial forestry and farmland, avoiding areas of ecological and archaeological interest, and reducing potential interactions with birds and bats. In addition, some pre-existing forestry roads and farm access roads were suitable for use and required limited upgrading. Portions of the existing site are currently used for agricultural grazing of livestock and commercial forestry, and it is proposed to continue these land use practices in conjunction with the continued wind farm operation.

The overall layout of the Proposed Development is shown on Figure 4-1. This drawing shows the current locations of the wind turbines, electricity substation, meteorological mast, access roads and the main site entrances. Detailed site layout drawings of the existing development are included in Appendix 4-1 to this EIAR.



Drawing Legend

- Planning Application Boundary
- Blue Line Boundary
- As Built Site Road
- As Built Substation Compound
- As Built Met Mast Compound
- As Built Hardstanding Area
- Turbine Sweep Area

N

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DRAWING TITLE:

Site Layout Plan

PROJECT TITLE:

SSE Dunneill Wind Farm

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210207	DRAWING No.: Figure 4-1
SCALE: 1:10,000 @ A3	DATE: 17.08.2022
OS SHEET No.: 1125, 1126	

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4.3 Development Components

The existing wind farm consists of a number of components. The various components of the existing wind farm are discussed in this section. Table 4-1 provides a summary of the footprint of the existing wind farm components. The Proposed Development is limited to an extension of the operational life of the existing wind farm. As such there are no changes proposed to the existing development components described in this section. The various elements of the existing wind farm will remain in their current condition and will be subject to ongoing standard maintenance.

Table 4-1 Proposed Development components footprint

Component Description	Approx. Area (m^2)
13 no. Turbines and associated hardstandings	11,378
1 no. Electrical control building, compound and hardstanding	455
1 no. Meteorological mast and hardstanding	50
Internal site access roads and parking area (approximate 5m running width for site roads)	16,600
Total	**28,383**

4.3.1 Wind Turbines

4.3.1.1 Turbine Locations

The existing wind turbine layout was optimised using industry standard wind farm design software at the initial design stage in order to maximise the energy yield from the site, while maintaining sufficient distances between the proposed turbines to ensure turbulence and wake effects did not compromise turbine performance. The Grid Reference coordinates of the turbine locations are listed in Table 4-2 below.

Table 4-2 Existing Wind Turbine Locations and Elevations

Turbine No.	Irish Transverse Mercator (ITM) Co-ordinates		Turbine Base Elevation (m OD)
	Easting (m)	Northing (m)	
1	544121	830124	112.8
2	544400	830249	110.5
3	544162	829890	118.9
4	544407	830029	116.5
5	544509	829848	121.1
6	544261	829729	122.6
7	544432	829610	130.7

Turbine No.	Irish Transverse Mercator (ITM) Co-ordinates		Turbine Base Elevation (m OD)
	Easting (m)	Northing (m)	
8	544464	829408	132.4
9	544986	828971	163.5
10	545242	829008	171.5
11	545082	828825	178.5
12	545244	828611	184.1
13	545294	828411	184.8

4.3.1.2 Turbine Type

Wind turbines use the energy from the wind to generate electricity. A wind turbine, as shown in Plate 4-1 below, typically consists of four main components:

- Foundation
- Tower
- Nacelle (turbine housing)
- Rotor

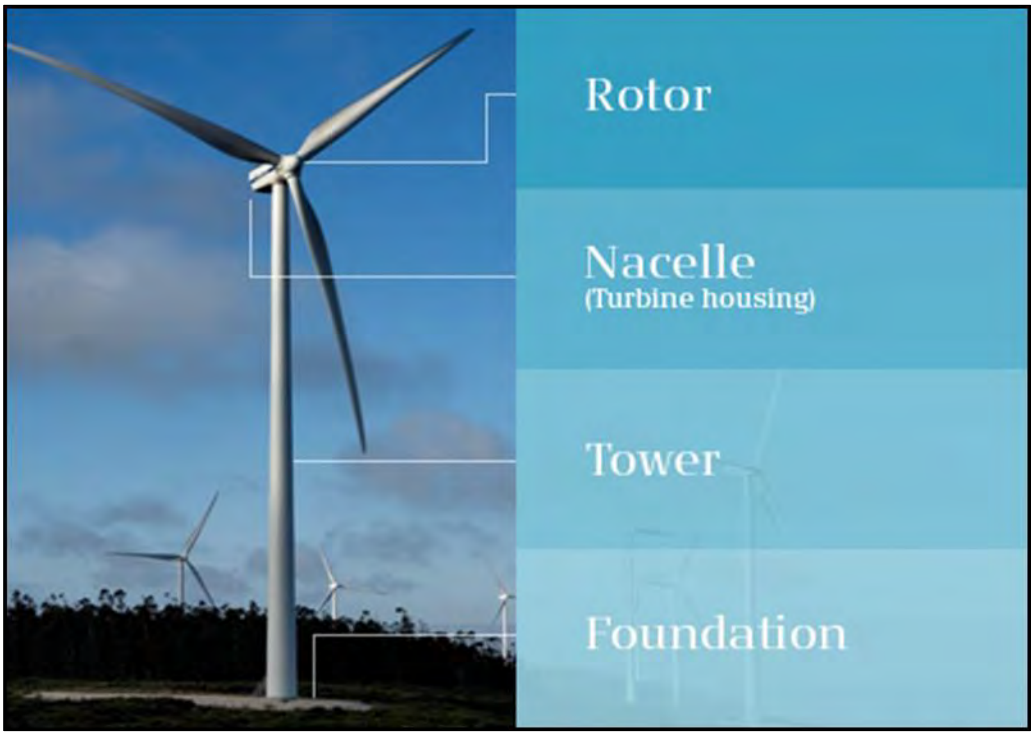
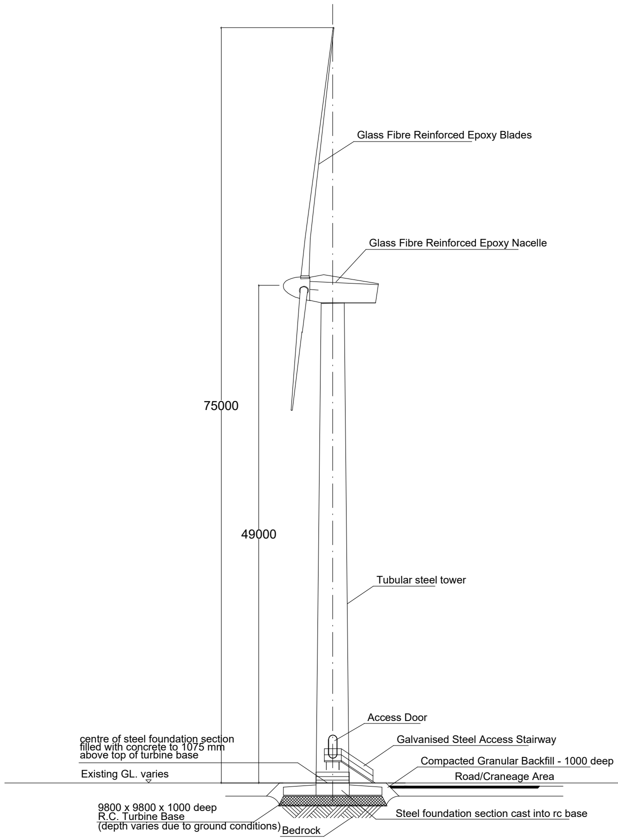


Plate 4-1 Wind turbine components

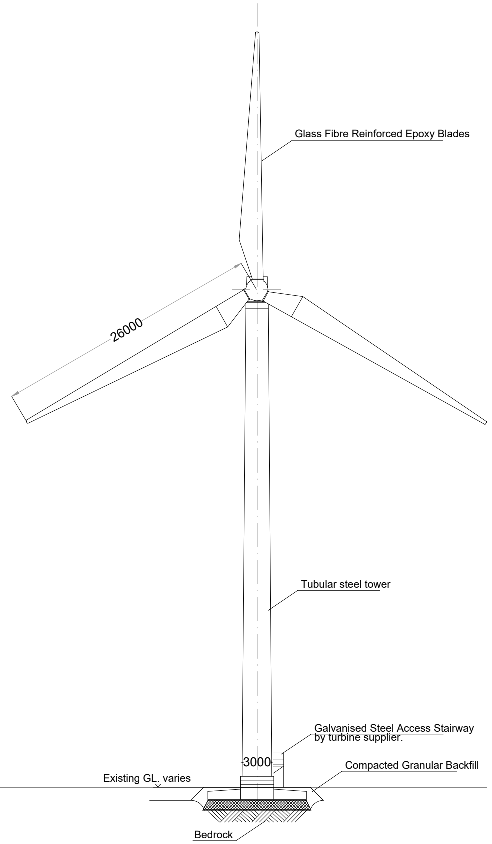
The existing wind turbines have a tip-height of 75m, a hub height of 49m, rotor diameter of 52m, and a ground to lowest blade swept path of 23m. The wind turbines that are installed on the site are conventional three-blade turbines, that are geared to ensure the rotors of all turbines rotate in the same direction at all times.

The existing wind turbines at the Dunneill Wind Farm were manufactured by the leading Danish turbine manufacturer, Vestas, with a Vestas V52 model installed at Dunneill. Each turbine is capable of producing 850kW of electricity. Turbine design parameters have a bearing on the assessment of shadow flicker, noise, visual impact, traffic and transport, and ecology (specifically birds), as addressed elsewhere in this EIAR. Since there are no changes proposed to the existing turbines at the site, the parameters of the existing turbines have been used in each EIAR section that requires consideration as part of the impact assessment.

A drawing of the existing wind turbine model is shown in Figure 4-2. The individual components of a typical geared wind turbine nacelle and hub are shown in Figure 4-3 below.



Side Sectional Elevation



Front Sectional Elevation

DRAWING TITLE:

Wind Turbine Elevations

PROJECT TITLE:

SSE Dunneill Wind Farm

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No: 210207	DRAWING No: Fig 4-2
SCALE: 1:500 @ A3	DATE: 16.08.2022

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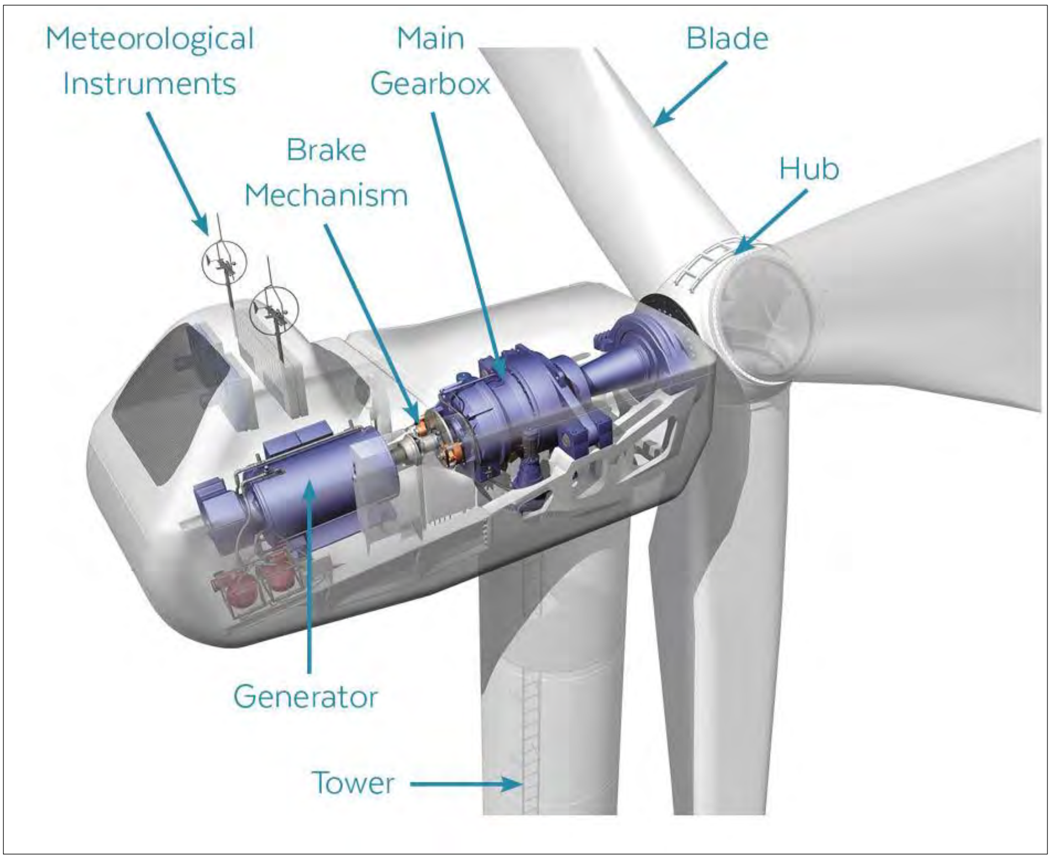


Figure 4-3 Turbine nacelle and hub components

Figure 4-4 shows a typical turbine base layout, including turbine foundation, hard standing area, assembly area, access road and surrounding works area.

Planning permission is being sought to extend the operational period for an additional 15 years, commencing from the date of expiration of the existing wind farm planning permission (ABP Pl. Ref. 21.204790) in March 2024. The Dunneill Wind Farm was developed and became operational in 2010 and has therefore been operational for approximately 12 years to date. By March 2024, the existing turbines will have been in operation for only 14 years, whereas the normal operational life of a turbine is typically 25 to 30 years. The wind farm operator has determined that the existing wind turbines at the Dunneill Wind Farm have a remaining lifespan of at least 15 years.

4.3.1.3 Turbine Foundations

Each wind turbine is secured to a reinforced concrete foundation that has been installed below the finished ground level. The turbine foundation transmits any load on the wind turbine into the ground. The existing turbine foundations are square in plan with each side measuring 11.5 metres in length, and with founding levels of 1.9m below ground level (bgl). The existing turbine foundations as designed for the Dunneill Wind Farm are shown in Figure 4-5.

There are no changes to the existing turbine foundations as part of the Proposed Development.

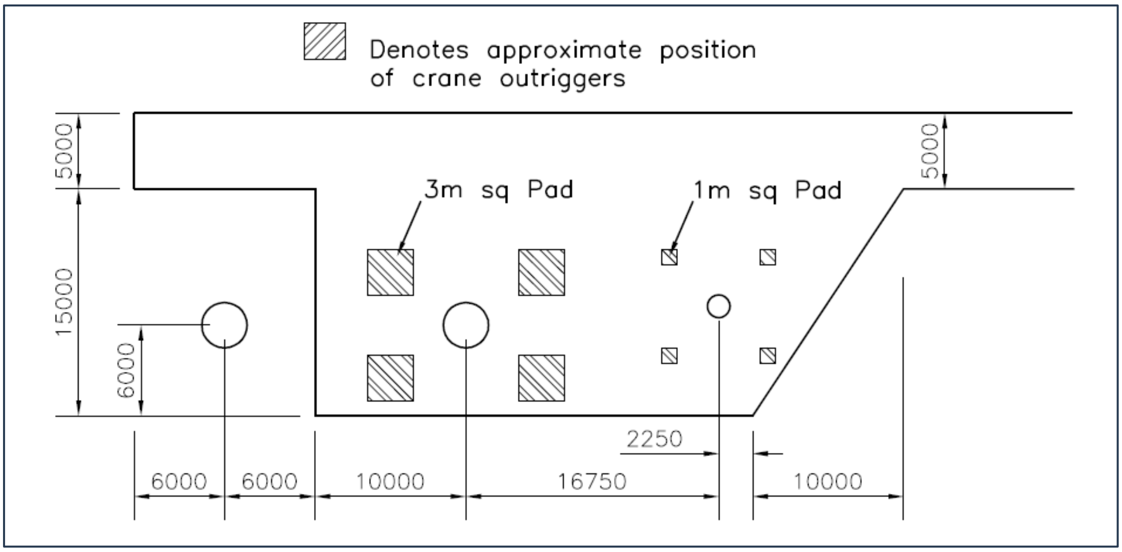
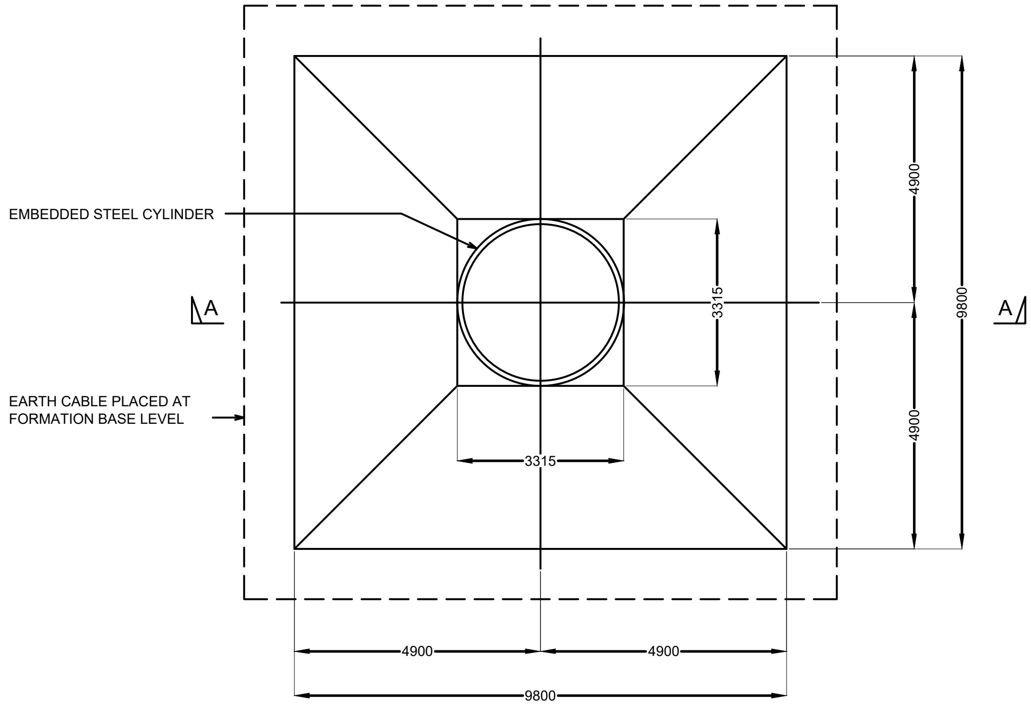


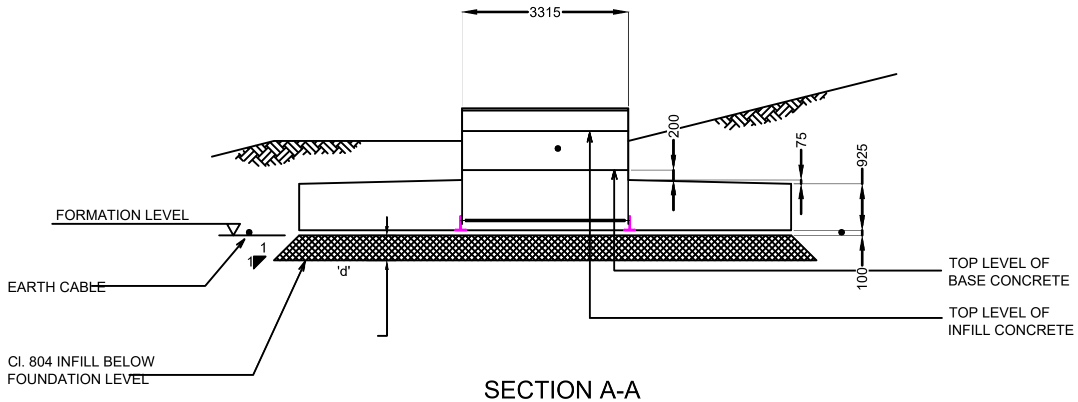
Figure 4-4 Typical Turbine Base Layout

NOTE:

1. ALL DIMENSIONS IN mm UNLESS NOTED



PLAN
SCALE 1:100



SECTION A-A
SCALE 1:100

DRAWING TITLE: Turbine Foundation	
PROJECT TITLE: SSE Dunneill Wind Farm	
DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210207	DRAWING No.: Fig 4-5
SCALE: 1:100 @ A3	DATE: 16.08.2022

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4.3.1.4 Hard Standing Areas

Hard standing areas consisting of levelled and compacted hardcore are required around each turbine base to facilitate access, turbine assembly and turbine erection. The hard-standing areas are typically used to accommodate cranes used in the assembly and erection of the turbine, offloading and storage of turbine components, and generally provide a safe, level working area around each turbine position. The hard-standing area is intended to accommodate a crane during turbine assembly and erection, decommissioning and disassembly, and if necessary, during maintenance works.

There will be no changes to the existing hardstanding areas required as part of the Proposed Development. Turbine hard stand areas vary slightly at each of the 13 no. turbines, with an average of approximately 875m^2. The existing hard standing areas shown on the detailed layout drawings included in Appendix 4-1 to this report will be maintained.

4.3.1.5 Power Output

The existing wind turbines have a rated electrical power output in the range of 0.85 megawatt (MW) per turbine. No changes are proposed to the existing wind turbines, therefore for the purposes of this EIAR, a rated output of 0.85MW has been chosen to calculate the power output of the 13-turbine wind farm, which results in an estimated installed capacity of 11MW. The existing wind farm has an average annual power output of 30,835 megawatt-hours per year (MWh/yr). It is anticipated that this power output would continue for the extended 15-year operation of the Proposed Development, subject to planning permission.

The 30,835MWh/yr of electricity produced by the Proposed Development would be sufficient to supply 7,341 Irish households with electricity per year, based on the average Irish household using 4.2 MWh[1] of electricity.

The 2016 Census of Ireland recorded a total of 65,535 occupied households in Co. Sligo. Per annum, based on the current average power output of 30,835MWh/yr, the Proposed Development would therefore produce sufficient electricity for the equivalent of approximately 11.2% of all households in Co. Sligo.

4.3.2 Site Roads

During the initial construction of the existing wind farm, existing farm and commercial forestry tracks were upgraded and new access roads were constructed to provide access within the wind farm site and to connect the wind turbines and associated infrastructure. Site roads were constructed of consolidated gravel with a running width of 5m. A typical section through an excavated site road is shown in Figure 4-6. A photograph of a typical existing site road in included as Plate 4-2.

There will be no changes to the existing site roads required as part of the Proposed Development.

1 March 2017 CER (CRU) Review of Typical Consumption Figures Decision https://www.cru.ie/document_group/review-of-typical-consumption-figures-decision-paper/

Plate 4-2 Typical existing site road

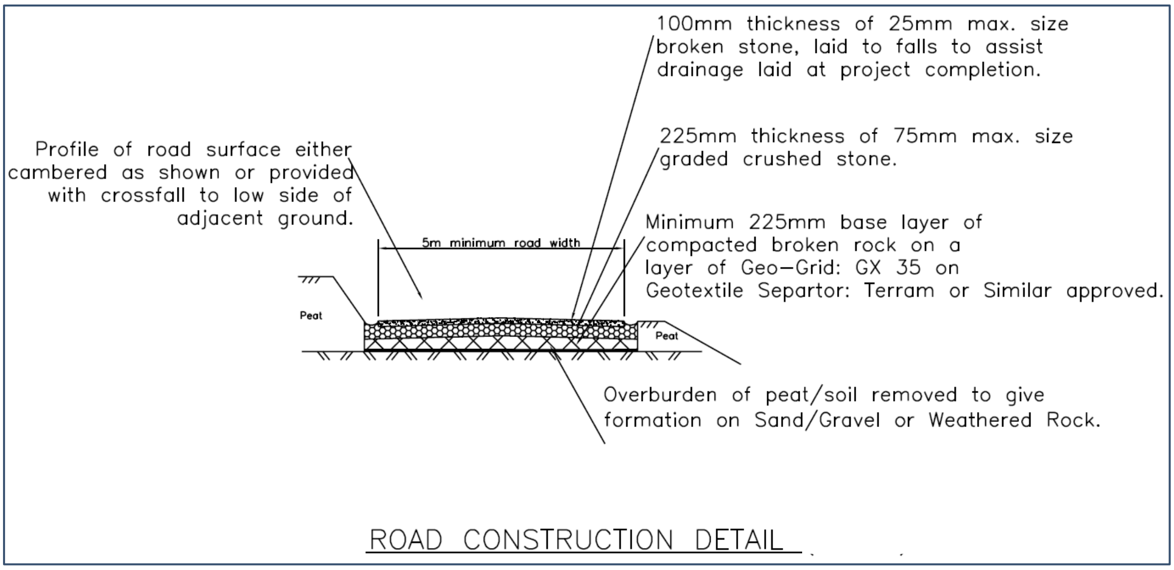


Figure 4-6 Typical Wind Farm Site Access Road Detail

4.3.3 Wind Farm Control Building

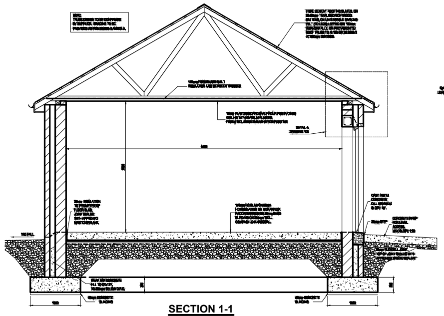
A wind farm control building is located within the substation compound. The control building area measures approximately 117m^2 (with an internal floor space of approximately 97 m$^{2)}$ and it is approximately 5m high, while the associated compound footprint measures approximately 455m^2. Plan and elevation drawings of the control building are included in Figure 4-7.

The wind farm control building includes staff welfare facilities for the staff that work on the site during the operational phase of the project. Toilet facilities are installed with a low-flush cistern and low-flow wash basin. Due to the specific nature of the Proposed Development, there is a very small water requirement for occasional toilet flushing and hand washing. Rainwater from the substation roof is collected in a water harvester located in the northeast corner of the compound. The water gravity feeds to a pump under the sink in the office and is pumped into an attic storage tank from where it gravity feeds into the toilet, wash hand basin and heater. All exposed pipe work is insulated. Legionella risk assessments and maintenance are carried out in accordance with the Safety, Health and Welfare at Work Act 2005 in relation to the prevention and control of legionella in the workplace and control measures are applied where required. There are 2 flow switches, both connected to the main board as follows:

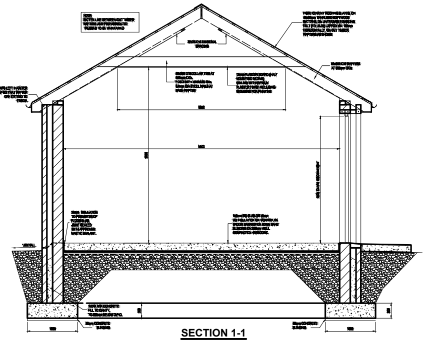
- Harvester tank to switch off pump when low in water.
- Tank in attic to switch off pump when tank is full.

Wastewater from the staff welfare facilities in the control buildings is managed by means of an existing 6,000 litre capacity septic tank, located approximately 5m southeast of the control building. As wastewater is treated on-site, the Environmental Protection Agency's (EPA) 2009 *Code of Practice: Wastewater Treatment and Disposal Systems Serving Single Houses (p.e. 10)* applies. Similarly, the EPA's 1999 manual *Treatment Systems for Small Communities, Business, Leisure Centres and Hotels* also applies, as it too deals with scenarios where it is proposed to treat wastewater on-site. The existing septic tank will continue to be maintained according to current best practice. The septic tank is inspected and maintained at regular intervals and drainage conditions at the site are very good.

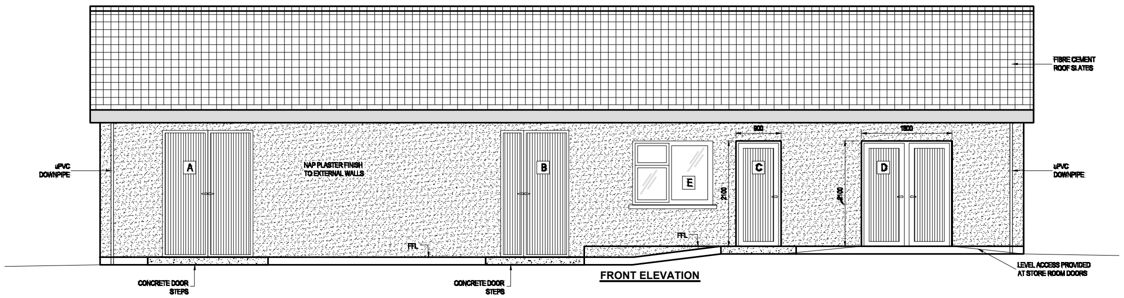
Only waste management companies holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007 (as amended), are employed to collect and transport wastewater away from the site to a licensed facility.



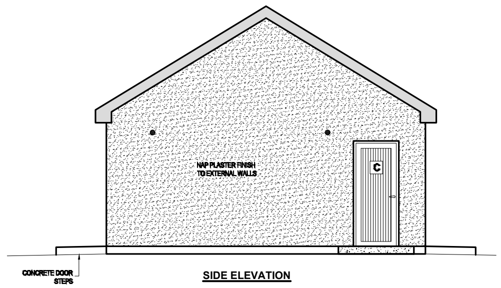
SECTION 1-1



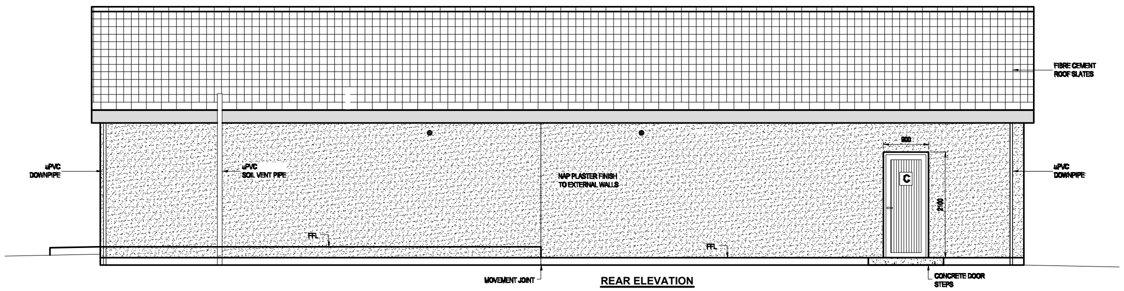
SECTION 1-1



FRONT ELEVATION



SIDE ELEVATION



REAR ELEVATION

DOORS AND WINDOWS:

EXTERNAL DOORS TO BE FLAT STEEL DOORS, FITTED WITH 3 PAIRS STEEL HINGES; PLATED STEEL DOOR HANDLE WITH GOOD QUALITY MORTICE LOCK.

A. DOUBLE DOOR TO SWITCHGEAR ROOM: CLEAR DOOR OPENING HEIGHT TO BE 2525mm. DOOR SUPPLIER TO CONFIRM STRUCTURAL OPE REQUIRED.

B. $1\frac{1}{2}$ DOOR TO CONTROL ROOM: CLEAR DOOR OPENING HEIGHT TO BE 2525mm. DOOR SUPPLIER TO CONFIRM STRUCTURAL OPE REQUIRED.

C. STANDARD PERSONNEL ACCESS DOOR.

D. STANDARD DOUBLE DOORS.

E. WINDOWS TO BE DOUBLE GALZED PVC. TYPICALLY 1600mm WIDE BY 1200mm HIGH. PRECAST CONCRETE SILLS.

DRAWING TITLE: **Substation Elevations**	
PROJECT TITLE: **SSE Dunneill Wind Farm**	
DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No: 210207	DRAWING No: Fig 4-7
SCALE: 1:100 @ A3	DATE: 16.08.2022

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4.3.4 Site Cabling

Each turbine is connected to the on-site electricity substation via underground 20kV electricity cables (XLPE 3 x IC c 9mm^2). 120mm aluminium communication cables also connect each wind turbine to the wind farm control building in the on-site substation compound. The electricity and communication cables running from the turbines to the on-site substation compound run in cable trenches approximately 1.1m below ground level, typically along the side of roadways and through cable ducts at road crossings. The route of the cable largely follows the access track to each turbine location.

Figure 4-8 below shows two variations of a typical cable trench designed for Dunneill Wind Farm, one for off-road trenches (installed on areas of soft ground that are not trafficked) and one for on-road trenches (where trenches run along or under a roadway). The cable route is marked above ground at intervals with cable location markers. While the majority of the cable trenches were backfilled with native material, clay subsoils of low permeability were also used to prevent conduit flow in the backfilled trenches.

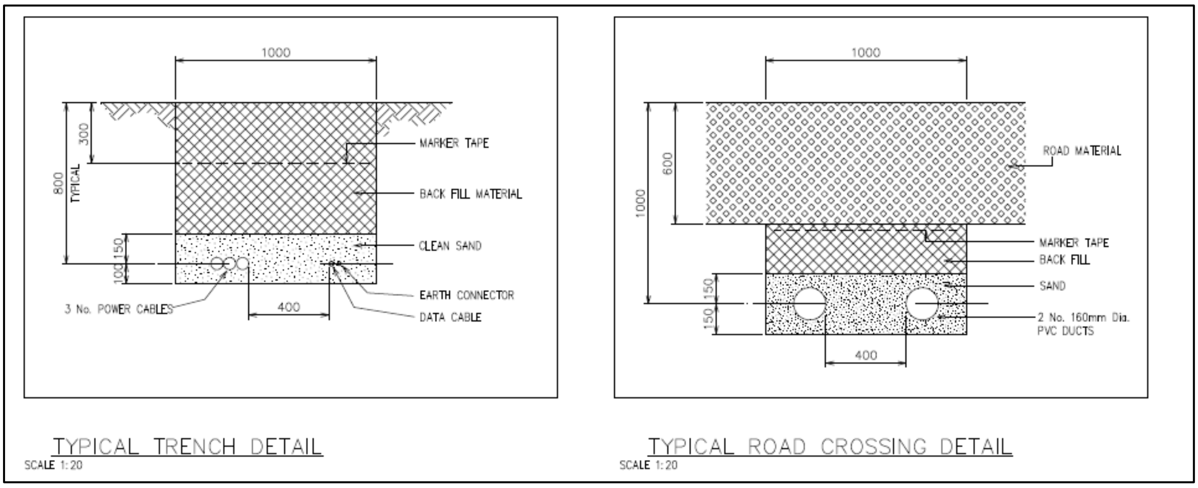
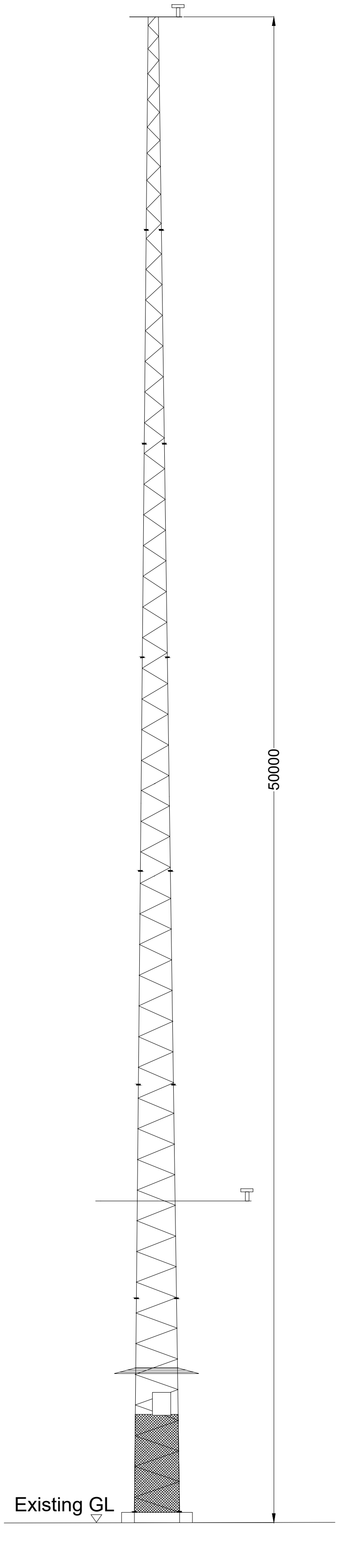


Figure 4-8 Typical Cable Trench Cross-section Detail

4.3.5 Meteorological Mast

One existing permanent metrological mast is included as part of the Proposed Development, located within the northern part of the site, south of Turbine No. 6. The metrological mast is equipped with wind monitoring equipment at various heights. The mast is a self-supporting slender structure of 50m in height. The met mast is located on a square concrete platform/base with each side measuring 7.1m in length and an associated surface area of approximately 50m^2. The concrete foundation is approximately 1.25m deep (bgl), while the top of the platform protrudes approximately 150mm above ground level. The mast is located at E544334 N829676 (ITM) as shown on the site layout drawing in Figure 4-1. The metrological mast levels and details are shown in Figure 4-99 and in Plate 4-3. There will be no changes to the existing meteorological mast as part of the Proposed Development.

Plate 4-3 Existing meteorological mast



DRAWING TITLE:

Met Mast Elevation

PROJECT TITLE:

SSE Dunneill Wind Farm

DRAWING BY: **Joseph O Brien**	CHECKED BY: **Meabhann Crowe**
PROJECT No.: **210207**	DRAWING No.: **Fig 4-9**
SCALE: **1:150 @ A3**	DATE: **16.08.2022**

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4.4 Access and Transportation

4.4.1 Site Entrance

Access to the wind farm site is via two existing entrances from the third-class/local road that bisects the site. One site entrance turns south towards the southern part of the wind farm (T9 – T13), and a second entrance turns north from the local road towards the northern area of the wind farm (T1 – T8). Both site entrances, either side of the local road are used for day-to-day maintenance and monitoring of the wind farm and substation. No changes to these site entrances are proposed.

4.5 Site Drainage

The topography across the site slopes downwards generally northwards towards the coastline with a maximum elevation of approximately 190 metres Ordnance Datum (m OD) in the south of the site, between turbine T12 and T13, and a minimum elevation of approximately 110 metres Ordnance Datum (m OD) in the south of the site at T2. The Dunneill River runs directly adjacent to and west of the existing wind farm, in a south-north direction towards Sligo Bay. Dunneill River is located approximately 15m west of the nearest wind farm infrastructure, running parallel to the access track between Turbine No. 7 and Turbine No. 6. Three existing shallow surface streams and drainage crossings were also recorded within the wind farm site. One stream is located in the north of the wind farm, along the access road between turbine T3 and T4 (ITM E544370 N829954) and runs in a south-north direction towards Doonbeakin river to the north of the wind farm which ultimately drains into Sligo Bay. The other two watercourse crossing are located in the south of the site, both of which run in an east-west direction, draining into Dunneill River. The grid coordinates for these locations are ITM E545075 N829051 along the main access road towards the southern section of the wind farm and ITM E545324 N828482 along the access track between Turbine T12 and T13. At the time of the site walkover (12th October 2021) these drainage channels were observed to be very low or dry.

During the original construction of the Dunneill Wind Farm, new internal site roads were constructed of consolidated gravel. The new site roads were constructed with a designed running width of 5m. Existing roads on the site were also widened to 5m. During the construction process both cross and longitudinal drainage provisions were made to enable existing drainage patterns to be maintained.

There are no ground disturbing works proposed as part of the Proposed Development. Therefore, no existing natural drainage features will be altered as part of the Proposed Development and there will be no direct or indirect discharges to natural watercourses. The Proposed Development will not result in any changes to the existing drainage within the project site.

4.6 Construction

No construction activities or alterations to the existing wind farm are proposed beyond routine maintenance during the operational phase of the Proposed Development.

4.7 Operation

The Proposed Development is expected to have a lifespan of 15 years. Planning permission is being sought for a 15-year operational period commencing from the date of expiration of the existing wind farm planning permission (ABP Pl. Ref. 21.204790) in March 2004. During the operational period, on a day-to-day basis the wind turbines will operate automatically, responding by means of anemometry equipment and control systems to changes in wind speed and direction.

The wind turbines are connected together, and data is relayed from the wind turbines to an off-site control centre. Each turbine will also be monitored off-site by the wind turbine supplier. The monitoring of turbine output, performance, wind speeds, and responses to any key alarms will be monitored at an off-site control centre 24-hours per day. The existing operational phase implements an ISO 14001 compliant Environmental Management System with external accreditation and certification to achieve best practice in environmental standards. All operational works on site will be carried out in strict adherence with SSE Renewable Health and Safety Policies and Procedures.

Each turbine will be subject to a routine maintenance programme involving monthly checks and intermittent changing of consumables, including oil changes. In addition, there will be a requirement for unscheduled maintenance, which could vary between resetting alarms to major component changes requiring a crane. Typically, maintenance traffic will consist of four-wheel drive vehicles or vans. The electricity substation and site tracks will also require periodic maintenance. The wind farm manager will continue to attend the site regularly to perform inspections and oversee maintenance works.

A detailed Operational and Environmental Management Plan (OEMP) has been prepared for the proposed 15-year extension of operation for the Dunneill Wind Farm and is included as Appendix 4-2 of this EIAR.

4.8 Decommissioning

The wind farm operator has determined that the existing wind turbines at the Dunneill Wind Farm have a remaining lifespan of at least 15 years. SSE have provided details of technical feasibility assessments undertaken concerning the lifetime extension of the Dunneill Wind Farm turbines, included as Appendix 3-1 to Chapter 3 of this EIAR.

It should be noted that decommissioning is required under the parent planning permission and the Proposed Development is postponing those activities for a further 15-years. Condition 10 of the original Planning Application granted by Sligo County Council (Pl. Ref. 03/619) states the following in relation to decommissioning of the wind farm:

> *'Upon termination of the use of the wind farm, the mast and turbines shall be dismantled and removed from the site and the site shall be restored to its existing condition in consultation with the planning authority. Prior to the commencement of development, the developer shall lodge with the planning authority, a cash deposit, a bond of an insurance company, or other security to secure the satisfactory reinstatement of the site on the cessation of the project. The amount of the security shall be 100,000 euro.'*

It is considered that this Condition is not appropriate, as returning the site to its original condition would involve removal of site roads and turbine foundations, which would require significant excavation and ground works. A more environmentally sensitive decommissioning plan is presented in Appendix 4-3 of this EIAR and described below.

Upon decommissioning of the Proposed Development, the wind turbines will be disassembled in reverse order to how they were erected. All above-ground turbine components will be separated and removed off-site for reuse or recycling. It is proposed to leave turbine foundations in place underground and to cover them with earth and reseed 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 significant environment nuisances such as noise, dust and/or vibration.

It is proposed that site roadways will be left in situ, as appropriate, to facilitate on-going agricultural and commercial forestry uses. 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, however, this is not envisaged at this time. It is proposed to leave underground cables in place where they are below a level likely to be impacted by typical agricultural works.

During decommissioning, it may be possible to reverse or at least reduce some of the potential impacts caused during the initial construction of the wind farm by rehabilitating construction areas such as turbine bases and hard standing areas. This will be done by covering with local topsoil and reseeding with a local native mix to encourage vegetation growth and reduce run-off and sedimentation. A decommissioning plan will be agreed with the local authorities at least three months prior to decommissioning of the Proposed Development.

As noted in the Scottish Natural Heritage (SNH) report *Research and Guidance on Restoration and Decommissioning of Onshore Wind Farms* (SNH, 2013) reinstatement proposals for a wind farm are typically made far in advance, so within the proposed 15-year extension of operation of the Proposed Development, technological advances and preferred approaches to reinstatement are likely to change. According to the SNH guidance, it is therefore:

> *'best practice not to limit options too far in advance of actual decommissioning but to maintain informed flexibility until close to the end-of-life of the wind farm'.*

Therefore, the decommissioning activities envisaged in the Decommissioning Plan have evolved since the original planning application was submitted and this EIAR, and the NIS, therefore, assesses the revised methodologies to be implemented.

APPENDIX 4-1

SITE LAYOUT AND PLANNING DRAWINGS

5. POPULATION AND HUMAN HEALTH

5.1 Introduction

This section of the Environmental Impact Assessment Report (EIAR) identifies, describes and assesses the potential impacts and effects of the Proposed Development on human beings, population and human health and has been completed in accordance with the EIA guidance and legislation set out in Chapter 1: Introduction. The full description of the Proposed Development is provided in Chapter 4 of this EIAR.

One of the principal concerns in the development process is that individuals or communities, should experience no significant diminution in their quality of life from the direct or indirect effects arising from the operation and decommissioning of a development. Ultimately, all the impacts of a development impinge on human health, directly and indirectly, positively and negatively. The key issues examined in this chapter of the EIAR include population, human health, employment and economic activity, land-use, residential amenity, community facilities and services, tourism, property values, shadow flicker, noise and health and safety.

There are 4 no. private residential dwellings within 500m of the existing turbines, which is the recommended minimum setback distance as per the current *2006 Wind Energy Development Guidelines (WEDG).* The closest third-party property (inhabitable dwelling) to the Proposed Development is located approximately 297m from the closest turbine (T5). This is slightly less than the recommended setback distance of 300m relating to the turbine tip-height (i.e., 4 times the tip-height of 75m), outlined in the *2019 Draft WEDG*.

There are 9 no. properties, both derelict and occupied, within 520m of the existing turbines (i.e., shadow flicker study area of ten times the rotor diameter (10 x 52 = 520m)). 5 no. of these properties are derelict buildings, 3 no. properties are inhabitable third-party dwellings, while one dwelling is a participating landowner. There are no existing planning permissions for residential properties within the study are of the existing Dunneill Wind Farm at the time of writing this report. The potential impacts from shadow flicker effects upon these properties are assessed in Section 5.7. Potential noise related impacts at these dwellings are detailed in Chapter 11 of this EIAR.

5.1.1 Statement of Authority

This section of the EIAR has been prepared by Niamh McHugh and David Naughton and reviewed by Thomas Blackwell, of MKO. Niamh is a Graduate Environmental Scientist who has recently taken up a position with MKO and has been involved in wind energy EIAR applications. Niamh holds a B.Sc (Hons) in Environmental Science. David is an Environmental Scientist with over five years of consultancy experience with MKO and has acted as project manager for numerous wind energy EIAR applications. David holds a BSc (Hons) in Environmental Science.

Thomas Blackwell is a Senior Environmentalist with MKO with over 15 years of progressive experience in environmental consulting. Thomas holds a BA (Hons) in Geography from Trinity College Dublin and a M.Sc. in Environmental Resource Management from University College Dublin. Prior to taking up his position with MKO in August 2019, Thomas worked as a Senior Environmental Scientist with HDR, Inc. in the United States and held previous posts with private consulting firms in both the USA and Ireland.

5.2 Population

5.2.1 Receiving Environment

This socio-economic study of the receiving environment included an examination of the population and employment characteristics of the area. Information regarding population and general socio-economic data were sourced from the Central Statistics Office (CSO), the Sligo County Development Plan 2017 – 2023, Fáilte Ireland and any other literature pertinent to the area. The study included an examination of the population and employment characteristics of the area. This information was sourced from the Census of Ireland 2016, which is the most recent census for which a complete dataset is available, also the Census of Ireland 2011, the Census of Agriculture 2010 and from the CSO website (www.cso.ie). Census information is divided into State, Provincial, County, Major Town and District Electoral Division (DED) level.

Dunneill Wind Farm is located on the northwest slopes of the Ox Mountains, located approximately 3.5 kilometres (km) south of the village of Dromore West and approximately 3.7 km southwest of the village of Templeboy in Co. Sligo. The wind farm site (EIAR site boundary) covers approximately 66 hectares (ha) with a development footprint of circa. 2.8 ha. The existing Dunneill Wind Farm site is located within 3 townlands in County Sligo, namely Crowagh (or Dunneill Mountain), Tawnadremira, and Ballyglass. Please refer to Figure 1-1 of Chapter 1: Introduction, for the site location.

For the purposes of this EIAR, where the 'Proposed Development' is referred to, this relates to all the project components described in detail in Chapter 4 of this EIAR which seeks planning permission to extend the operation of Dunneill Wind Farm for an additional 15 years. Where the 'the site' is referred to, this relates to the primary study area for the development, as delineated by the EIAR Site Boundary in green as shown on the EIAR figures. The actual site boundary for the purposes of the planning permission application occupies a smaller area within this primary area.

In order to assess the population in the vicinity of the Proposed Development, the Study Area for the Population section of this EIAR was defined in terms of the District Electoral Divisions (DEDs) where the site is located, and where relevant, nearby DEDs which may be affected by the Proposed Development. The Proposed Development lies predominantly within Templeboy South / Mullagheruse DED, while also lying partly in the adjacent DED of Dromore. These DEDs therefore comprise the study area. The Study Area has a population of 680 persons, as of 2016 and comprises a total land area of 96 km^2 (Source: CSO Census of the Population 2016).

5.2.2 Population Trends

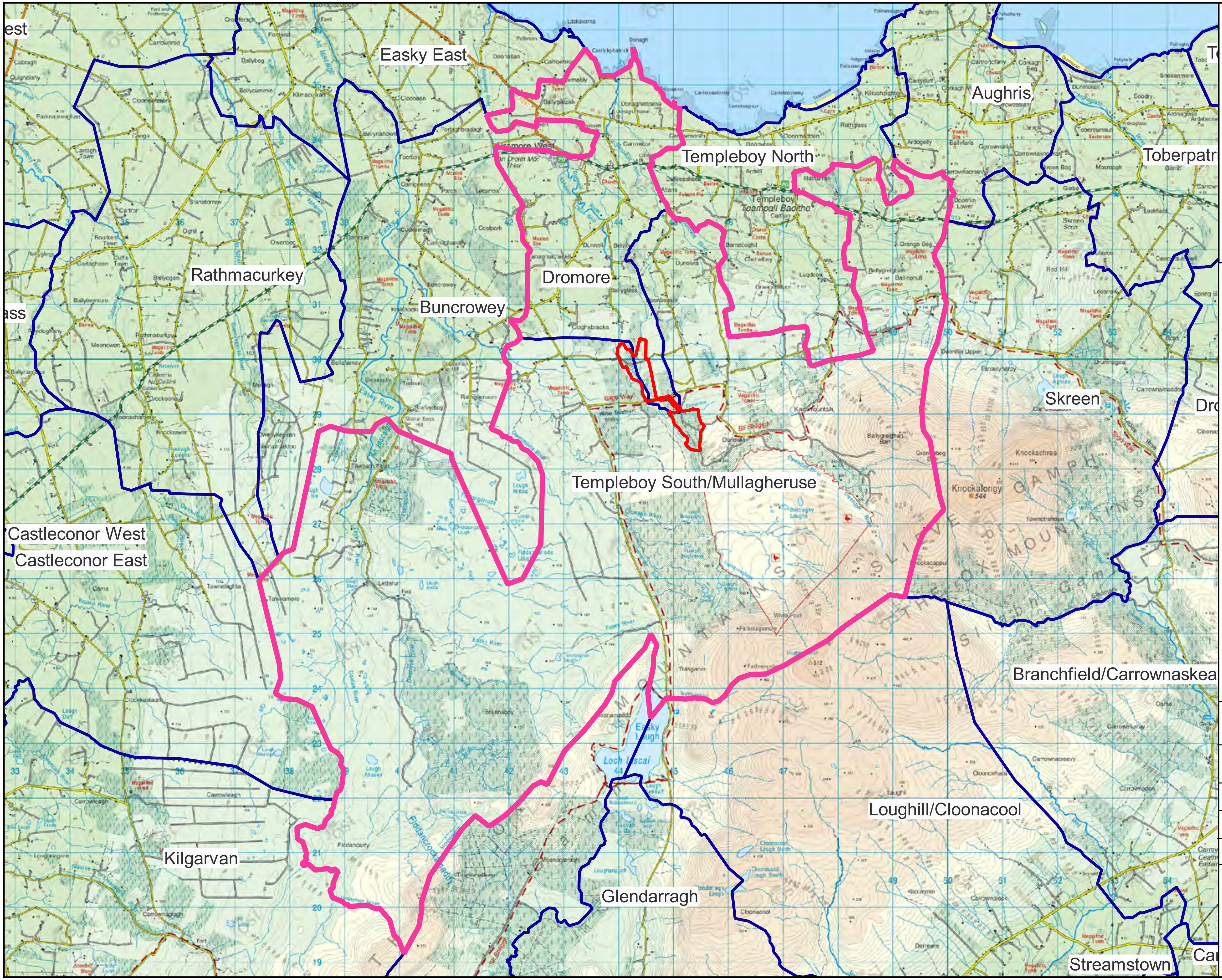
In the period between the 2011 and the 2016 Census, the population of Ireland increased by 3.8%. During this time, the population of County Sligo grew by 1.0% to 65,535 persons. Other population statistics for the State, County Sligo and the Study Area have been obtained from the Central Statistics Office (CSO) and are presented in Table 5-1.

Table 5-1 Population 2011 – 2016 (Source: CSO)

Area	Population Change		% Population Change
	2011	2016	2011 - 2016
State	4,588,252	4,761,865	3.8%
County Sligo	65,393	65,535	1.0%
Study Area	698	680	-2.6%

The data in Table 5-1 shows that the population of the Study Area reduced in the period between the 2011 Census and the 2016 Census by 2.6% from 698 to 680 people. The rate of population growth declined in this period, which contrasts with the growing population of both the State and County.

The data presented in Table 5-1 shows that the population of the Study Area decreased by 2.6% between 2011 and 2016. When the population data is examined in closer detail, it shows that the rate of population decrease within the Study Area is consistent across the two DEDs which make up the Study Area. Both Templeboy South / Mullagheruse and Dromore EDs experienced a slight population decline in this period (6.2% and 0.8% respectively.)



Map Legend

- EIAR Site Boundary_V2_2022
- Study Area DED V1 - 2022.08
- electoral_divisions

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Drawing Title	
Population Study Area	
Project Title	
SSE Dunniell Wind Farm, Co. Sligo	
Drawn By: SND	Checked By: TB
Project No.: 210207	Drawing No.: 5-1
Scale: 1:90000	Date: 2022-08-12

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5.2.3 Population Density

The population densities recorded within the State, County Sligo and the Study Area during the 2011 and 2016 Census are shown in Table 5-2.

Table 5-2 Population Density in 2011 and 2016 (Source: CSO)

Area	Population Density (Persons per square kilometre)	
	2011	2016
State	65.6	68.1
County Sligo	35.6	35.7
Study Area	7.3	7.1

The population density of the Study Area recorded during the 2016 Census was 7.1 persons per km^2. This figure is significantly lower than the national population density of 68.1 persons per km^2 and the county population density of 35.9 persons per km^2. These findings confirm that the site of the Proposed Development is located within a very sparsely populated area.

The population densities recorded during 2016 around the Proposed Development site are varied across the two DEDs. Templeboy South / Mullagheruse DED had the lower of the two recorded population densities at 2.5 persons per km^2, while Dromore ED had the higher of the two population densities at 36.6 persons per km^2.

5.2.4 Household Statistics

The number of households and average household size recorded within the State, County Sligo and the Study Area during the 2011 and 2016 Censuses are shown in Table 5-3.

Table 5-3 Number of Household and Average Household Size 2011 – 2016 (Source: CSO)

Area	2011		2016	
	No. of Households	Avg. Size (persons)	No. of Households	Avg. Size (persons)
State	1,654,208	2.8	1,702,289	2.8
County Sligo	33, 044	2.0	32, 764	2.0
Study Area	255	2.7	266	2.6

The figures in Table 5-3 show that the number of houses on a State level, the number of households slightly increased in the period between 2011 and 2016. On a County and Study Area level, however, the number of Households experienced a slight decline in this same period. It must also be noted that the average number of people per household also decreased by 0.1% in this period. This contrast with the figures presented for the State and is also a higher figure than that presented for County Sligo.

A closer look at this data also show that this decreasing trend is uniformly distributed across the DEDs which encompass the Study Area. Templeboy South/ Mullagheruse DED experienced a slight decrease in the average household size from 2.9 persons in 2011 to 2.8 persons in 2016. Dromore DED also experienced a slight decrease in average number of persons per household from 2.7 persons in 2011 to 2.5 persons in 2016.

5.2.5 Age Structure

Table 5-4 presents the population percentages of the State, County Sligo and Study Area within different age groups as defined by the Central Statistics Office during the 2016 Census. This data is also displayed in Figure 5-2.

Table 5-4 Population per Age Category in 2016 (Source: CSO)

Area	Age Category				
	0 – 14	15 – 24	25 - 44	45 - 64	65 +
State	1,006,552	576,452	1,406,291	1,135,003	637,567
County Sligo	13,313	8,017	16,744	16,837	10,624
Study Area	149	68	154	203	106

The proportion of persons in the 65+ category in the Study Area population is higher than that recorded at a State level. This highlights an ageing population in the Study Area. For the Study Area, the highest population percentage occurs within the 45-64 age category followed by the 25-44 age category, while the two least represented age categories are 15-24 and 65+.

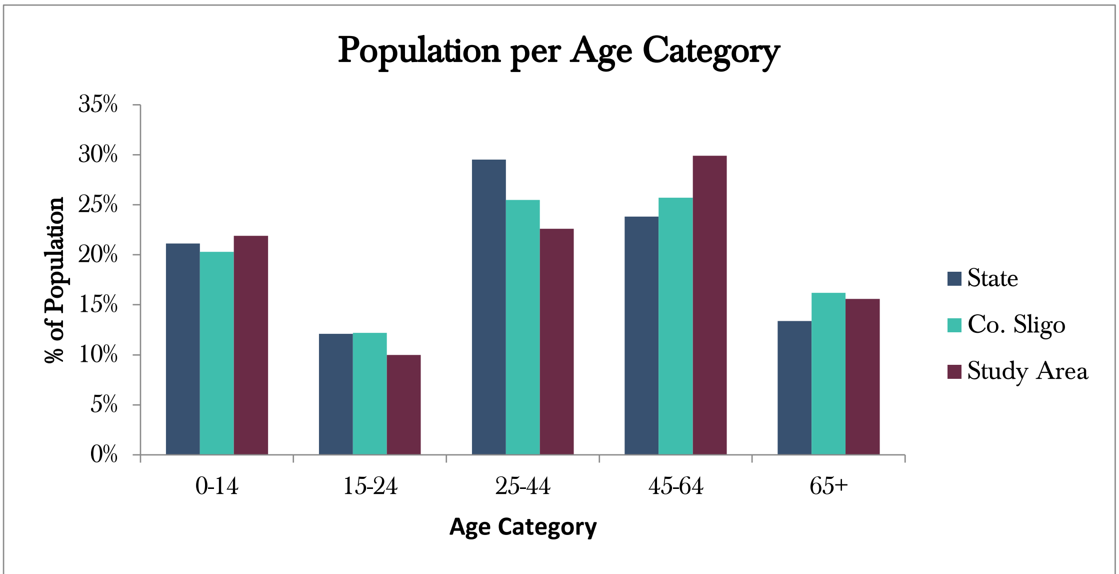

Figure 5-2 Population per Age Category in 2016 (Source: CSO)

5.2.6 Employment and Economic Activity

5.2.6.1 Economic Status of the Study Area

The labour force consists of those who are able to work, i.e., those who are aged 15+, out of full-time education and not performing duties that prevent them from working. In 2016, there were 2,304,037 persons in the labour force in the State. Table 5-5 shows the percentage of the total population aged 15+ who were in the labour force during the 2016 Census. This figure is further broken down into the percentages that were at work or unemployed. It also shows the percentage of the total population aged

15+ who were not in the labour force, i.e., those who were students, retired, unable to work or performing home duties.

Table 5-5 Economic Status of the Total Population Aged 15+ in 2016 (Source: CSO)

Status		State	County Sligo	Study Area
% of population aged 15+ who are in the labour force		**61.4%**	**61.4%**	**58.9%**
% of which are:	At work	87.1%	86.6%	82.7%
	First time job seeker	1.4%	1.3%	0.3%
	Unemployed	11.5%	12.2%	16.9%
% of population aged 15+ who are not in the labour force		**38.6%**	**38.6%**	**41.1%**
% of which are:	Student	29.4%	28.8%	24.8%
	Home duties	21.1%	16.4%	29.8%
	Retired	37.6%	42.0%	35.8%
	Unable to work	10.9%	11.6%	9.2%
	Other	1.0%	1.2%	0.5%

Overall, the principal economic status of those living within the Study Area is broadly similar to that recorded at both State and County Level. During the 2016 Census, the percentage of people over the age of 15 who were in the labour force were similar at a State, County and Study Area level. Of those who were not in the labour force during the 2016 Census, the highest percentage of the Study Area population were 'Retired' individuals, which correlates with both the State and County figures.

5.2.6.2 Employment by Socio-Economic Group

Socio-economic grouping divides the population into categories depending on the level of skill or educational attainment required. The 'Higher Professional' category includes scientists, engineers, solicitors, town planners and psychologists. The 'Lower Professional' category includes teachers, lab technicians, nurses, journalists, actors and driving instructors. Skilled occupations are divided into manual skilled such as bricklayers and building contractors; semi-skilled such as roofers and gardeners; and unskilled, which includes construction labourers, refuse collectors and window cleaners. Figure 5-3 shows the percentages of those employed in each socio-economic group in the State, County Sligo and the Study Area during 2016.

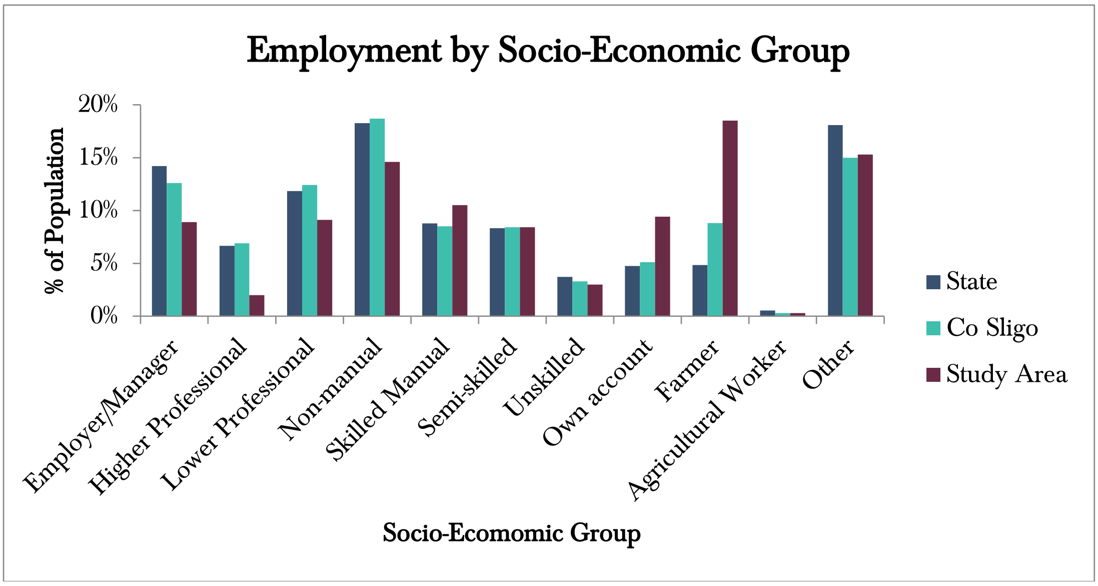

Figure 5-3 Employment by Socio-Economic Group in 2016 (Source: CSO)

The highest level of employment within the Study Area was recorded in the Farmer category. The levels of employment within the Employer/Manager, Higher Professional, Lower Professional and Non-Manual categories in the Study Area were much lower than those recorded for the State and County Sligo, while those recorded within the Skilled Manual, Own Account and Farmer categories were higher. The Semi-Skilled worker category was largely the same as that recorded at a State and County level.

The CSO employment figures grouped by socio-economic status includes the entire population for the Study Area, County and State in their respective categories. As such, the socio-economic category of 'Other' is skewed to include those who are not in the labour force.

5.2.6.3 Employment and Investment Potential in the Irish Wind Energy Industry

5.2.6.3.1 *Background*

A report entitled '*Jobs and Investment in Irish Wind Energy – Powering Ireland's Economy'* was published in 2009 by Deloitte, in conjunction with the Irish Wind Energy Association (IWEA). This report focused on the ability of the Irish wind energy industry to create investment and jobs. In terms of the overall economic benefit to be obtained from wind energy, the report states in its introduction:

> *"Ireland is fortunate to enjoy one of the best wind resources in the world. Developing this resource will reduce and stabilise energy prices in Ireland and boost our long-term competitiveness as an economy. It will also significantly reduce our dependence on imported fossil fuels."*

A report published in 2014 by Siemens entitled '*An Enterprising Wind - An economic analysis of the job creation potential of the wind sector in Ireland*', also in conjunction with the Irish Wind Energy Association (IWEA), concluded that, *'a major programme of investment in wind could have a sizeable positive effect on the labour market, resulting in substantial growth in employment.'* The report considers the potential types of direct employment created, as a result of increased investment in wind energy, to be:

- Wind Energy Industry Employment:

- Installation
- Development
- Planning
- Operation and Maintenance
- Investor activity
- Electricity Grid Network Employment
- Potential Wind Turbine Manufacturing Employment

The Sustainable Energy Authority of Ireland[1] demonstrates in their '*Wind Energy Roadmap 2011-2050*', that '*the wind energy resource represents a significant value to Ireland by 2050. This value is presented in terms of its ability to contribute to our indigenous energy needs, the benefits of enhanced employment creation and investment potential, and the ability to significantly abate carbon emissions to 2050.*'

5.2.6.3.2 Energy Targets

The Climate Action Plan 2019 (CAP) was published on the 1st of August 2019 by the Department of Communications, Climate Action and Environment. The CAP sets out an ambitious course of action over the coming years to address the impacts which climate may have on Irelands environment, society, economic and natural resources. The CAP includes a commitment that 70% of Ireland's electricity needs will come from renewable sources by 2030. It is envisaged that wind energy will provide the largest source of renewable energy in achieving this target.

5.2.6.3.3 Employment Potential

The 2014 report *"An Enterprising Wind: An economic analysis of the job creation potential of the wind sector in Ireland"* published by the Irish Wind Energy Association (IWEA) predicted that the wind energy sector in Ireland would result in 6,659 direct jobs in a scenario where 4GW capacity is achieved by 2020. This figure of 6,659 is broken down further; 5,596 of these jobs are associated directly with the construction and installation of windfarms, while the remaining 1,063 jobs are associated with the national grid. Under this scenario this contributes 1.66 direct jobs per Megawatt (MW) of wind capacity throughout the various stages of installation. According to Wind Energy Ireland, the installed wind capacity in Ireland is over 4.2GW as of February 2021, which would support employment during the last decade. Ireland needs to achieve a total of 8.2GW of onshore wind by 2030 which will further support further employment.

The Sustainable Energy Authority of Ireland[2] estimates, in their '*Wind Energy Roadmap 2011-2050*', note that '*Onshore and offshore wind could create 20,000 direct installation and O&M jobs by 2040*'. Furthermore, '*wind energy resource represents a significant value to Ireland by 2050. This value is presented in terms of its ability to contribute to our indigenous energy needs, the benefits of enhanced employment creation and investment potential, and the ability to significantly abate carbon emissions to 2050*'

The 2014 report '*The Value of Wind Energy to Ireland*', published by Pőyry, stated that growth of the wind sector in Ireland could support 23,850 jobs (construction and operational phases) by 2030. If Ireland instead chooses to not develop any more wind, then by 2030 the country will be reliant on natural gas for most of our electricity generation, at a cost of €671 million per annum in fuel import costs.

Internationally, a report issued by WindEurope in September 2017, entitled '*Wind energy in Europe: Scenarios for 2030*' details various scenarios in Europe in respect to the EU target for renewable energy. According to WindEurope's High Scenario, which assumes favourable market and policy conditions

[1] *SEAI (2019), https://www.seai.ie/publications/Wind_Energy_Roadmap_2011-2050.pdf*
[2] *SEAI (2019), https://www.seai.ie/publications/Wind_Energy_Roadmap_2011-2050.pdf*

including the achievement of a 35% EU renewable energy target (slightly higher than the 32% EU target for renewables), '*397 GW of wind energy capacity would be installed in the EU by 2030, 298.5 GW onshore and 99 GW offshore. In this scenario, the wind energy industry would invest €351bn by 2030, and it would create 716,000 jobs'.*

As of February 2021, there were 5,510 Megawatts (MW) of wind energy capacity installed on the island of Ireland[3]. Of this, 4,235 MW was installed in the Republic of Ireland, with 1,276 MW installed in Northern Ireland. The majority of the Republic of Ireland's installed wind energy capacity is located in Counties Donegal, Galway, Cork and Kerry, contributing to employment potential on the Island of Ireland.

5.2.6.3.4 Economic Value

A 2019 report by Baringa, '*Wind for a Euro: Cost-benefit analysis of wind energy in Ireland 2000-2020*', has analysed the financial impact for end consumers of the deployment of wind generation in Ireland over the period 2000-2020. The report calculates how the costs and benefits for consumers would have differed if no wind farms had been built. The analysis indicated that the deployment of 4.1 GW of wind generation capacity in Ireland between 2000 and 2020 (2018-2020 results being projective) will result in a total net cost to consumers, over 20 years, of €0.1bn (€63 million to be exact), which equates to a cost of less than €1 per person per year since 2000. Further cost benefit analysis noted that wind energy has delivered €2.3 billion in savings in the wholesale electricity market. As such, the economic benefit of renewable energy to consumers is greater than what would have been if Ireland did not invest in wind power. This corresponds with the Deloitte report which indicates that more wind energy feeding into the national grid will result in lower and more stable energy costs for consumers.

Furthermore, in May 2020, IWEA released its 70by30 Implementation Plan Reports which further details the savings that can be made from the continuation of onshore wind. The report, entitled '*Saving Money - 70 by 30 Implementation Plan*', notes that '*Baringa calculated previously that if onshore wind in Ireland can be delivered at €60/MWh, on average, between 2020 and 2030, then the 70 per cent renewable electricity target set out in the Climate Action Plan will actually be cost neutral for the consumer. If we can achieve prices under €60/MWh then Ireland's electricity consumers will be saving money*'.

The Proposed Development will, if consent is granted, contribute to the economic value that renewable energy brings to the country.

5.2.7 Land-Use

As previously noted, the Proposed Development site is currently operational as a wind farm and has been since 2010. The site is situated on a mixture of farmland and commercial forestry. The Proposed Development includes no additional infrastructure. The predominant surrounding land use within the Population study area is agricultural, with the data contained in Table 5-6 below indicating a predominant use for pasture. The southern portion of the site is located within a conifer plantation, whereas the northern portion of the site is predominantly used as agricultural grassland, with small pockets of forestry. No additional changes are to be made to the land uses of the areas surrounding the Proposed Development. The EIAR Study Area for Dunneill Wind Farm covers approximately 66 hectares (ha) with a development footprint of approximately 2.8 ha. The existing wind farm is located within 3 townlands in Co. Sligo: Crowagh (or Dunniell Mountain), Tawnadremira, and Ballyglass.

The total area of farmland within the two DEDs around the Wind Farm site (Templeboy South / Mullagheruse DED and Dromore DED) measures approximately 5,043.6 hectares, comprising approximately 53% of the study area (9,600 hectares) according to the CSO Census of Agriculture 2020.

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[3] *IWEA – Facts and Stats, https://www.iwea.com/about-wind/facts-stats*

There are 102 farms within the Study Area, with an average farm size of 48.15 hectares. This is significantly larger than the 26.3-hectare average farm size for Co. Sligo.

The average age of farm owners within the Study Area, is approximately 59 years old. Table 5-6 shows the breakdown of farmed lands within the Study Area. Farmland within the study area is entirely grassland for livestock grazing, with no land recorded for cereals or tillage. Livestock within the study area is predominantly sheep with a smaller beef herd also recorded within the study area. There were no dairy cows recorded during the CSO Census of Agriculture 2020 within the Study Area.

Table 5-6 Farm Size and Classification within the Study Area in 2020 (Source: CSO)

Characteristic	Value
Size of Study Area	9,600 hectares
Total Area Farmed within Study Area	5,043.6 hectares
Farmland as % of Study Area	53%
Breakdown of Farmed Land	**Area (hectares)**
Total Grassland	5,037.3 ha
Total Cereals	0 ha
Total Cattle Herd (Beef)	2,550
Total Dairy Cows	0
Total Sheep	11,714

5.2.8 Services

The proposed development is located approximately 3.5 km south of the village of Dromore West and approximately 3.7 km south of the village of Templeboy in Co. Sligo. The main services for the study area are located within the town of Ballysadare, which lies approximately 28 km east of the Proposed Development. Additionally, the town of Ballina lies approximately 30 km southwest of the proposed development and encompasses larger scale retail and services are available.

5.2.8.1 Education

The nearest school to the EIAR Site Boundary is St. Mary's National School, located approximately 10.2 km northeast of the EIAR Site Boundary (not from closest point, not sure pf the exact site boundary). St Joseph's National School is located approximately 14.6 km west of the EIAR Site Boundary for the Proposed Development.

The closest secondary school is Coláiste Iascaigh which is located approximately 17 km north of the Proposed Development.

The closest Third-Level Institution to the site is IT Sligo which is located approximately 38.4 km northeast of the Proposed Development.

5.2.8.2 Access and Public Transport

The Proposed Development site is accessed via local roads off the N59 National Road, which travels in an east-west direction north of the site and the N17 National Road which runs in a south-north direction to the south of the site. The current entrance to the Dunneill Wind Farm will remain the primary entrance, utilising the existing access roads and infrastructure. There is no need for the building of additional access routes or forestry roads for construction machinery as this site is currently operational and does not require any further construction work.

The site of the Proposed Development is not served by public transport. The nearest train station to the Proposed Development site is at Collooney, located approximately 30 km east of the site.

From the village of Cloonacool, approximately 26 km south of the Proposed Development, there are Bus Eireann connections to Sligo Town, from which a significant number of destinations may be reached. Sligo Town is located approximately 36.5 km north-east of the Proposed Development.

5.2.8.3 Amenities and Community Facilities

The majority of amenities and community facilities, including GAA and other sports clubs, youth clubs and recreational areas available in the area are located in the centres of settlement throughout the wider area. Retail and personal services within the vicinity are provided in the larger settlements in the wider area such as Ballysadare, Sligo Town, and Ballina. The County Council has a branch library in Sligo town also.

The varied natural environment of this area of County Sligo provides opportunities for walking, cycling and horse riding, however, there are no designated walking trails within the site of the current proposal.

The nearest designated walking routes lie to the southeast, the Knocknashee Walk and the Sligo Camino in the village of Coolaney which are approximately 29km to the southwest.

Community Benefit proposals, which would enhance local amenities and community facilities are described in Chapter 4: Description of the Proposed Development.

5.3 Tourism

5.3.1 Tourism Numbers and Revenue

Tourism is one of the major contributors to the national economy and is a significant source of full time and seasonal employment. During 2018, total tourism revenue generated in Ireland was approximately €9.1 billion, an increase on the €8.8 billion revenue recorded in 2017. Overseas tourist visits to Ireland in 2018 grew by 6.5% to 9.6 million (‘*Tourism Facts 2018*, Fáilte Ireland, September 2019).

Ireland is divided into seven tourism regions. Table 5-7 shows the total revenue and breakdown of overseas tourist numbers to each region in Ireland during 2018 (‘*Tourism Facts 2018*, Fáilte Ireland, September 2019).

Table 5-7 Overseas Tourists Revenue and Numbers 2018 (Source: Fáilte Ireland)

Region	Total Revenue (€m)	Total Number of Overseas Tourists (000s)
Dublin	€2,095m	6,309
Mid-East/Midlands	€ 393m	1,030

Region	Total Revenue (€m)	Total Number of Overseas Tourists (000s)
South-East	€261m	1,028
South-West	€987m	2,512
Mid-West	€511 m	1,497
West	€727m	1,963
Border	**€244m**	**752**
Total	**€5,218 m**	**15,091**

The Proposed Development site is located within the Border Region. According to '*Regional tourism performance in 2018'* (Fáilte Ireland, September 2019) the Border Region which comprises Counties Sligo, Leitrim, Cavan, Donegal, Monaghan and Louth, benefited from approximately 5% of the total number of overseas tourists to the country and approximately 4.7% of the associated tourism income generated in Ireland in 2018.

Although the data for 2018 or more recent years are not available, Table 5-8 presents the most recently published breakdown of overseas tourist numbers and revenue to the Border region during 2017 ('*2017 Topline Tourism Performance by Region,* Fáilte Ireland, August 2018). As can be observed in Table 5-8, County Sligo had the second highest tourism revenue within the Region during 2017 at €96, which is significantly higher than the revenue recorded for the counties of Leitrim and Monaghan.

Table 5-8 Overseas Tourism to Border Region during 2017 (Source: Fáilte Ireland)

Region	Total Revenue (€m)	Total Number of Overseas Tourists (000s)
Cavan	€80m	313
Donegal	€178m	631
Leitrim	€50m	247
Louth	€85m	351
Monaghan	€55m	239
Sligo	€96m	420

5.3.2 Tourist Attractions

There are no key identified tourist attractions pertaining specifically to the Proposed Development site itself. The varied natural landscape and scenic amenity of this area provide many opportunities for general outdoor recreation within the wider area including walking, cycling and horse-riding, as described in Section 5.2.8.3 above.

County Sligo has a wide range of nationally significant tourism assets which include the following:

- Strandhill Village – Seaside village with walking trails into the foothills of the Knocknarea Mountain and water sport classes.

- Sligo Town – Scenic walks along the Garavogue River and boat tours available of Lough Gill, Guided 'William Butler Yeats Tours' also.
- Easkey Village – Walkways around the ruins of Roslee Castle, Easkey Abbey and Rathlee Tower. Seaside walks along Easkey Pier, fishing destination. Surfing and kayaking lessons available on Lough Easkey and on Easkey Beach.
- Enniscrone Town – Scenic walks along the banks of Killala Bay, guided audio tours of Enniscrone town.
- Mulloughmore – seaside resort town, world renowned surfing destination.
- Rosses Point – picturesque village with Rosses Point Coastal Trail for walking or cycling.
- Rivers and Lakes – Range of water sports available as well as fishing hotspots.
- Golf courses – Many golf courses including one of Ireland's most famous golf courses in Enniscrone Golf Course.
- The Coastline – 100s of km of scenic coastlines. Marine activities including Blue Flag Beaches.
- Mountain ranges including: the Ox Mountains, Dartry Mountains, Benbulben, Tievebaun Mountain – important centres for sight-seeing, walking, and related activities.
- The Towns and Villages of County Sligo where there is significant potential for heritage led tourism.

The Study Area is not within any of the strategic tourism areas identified in the CDP nor does it impact on any of the sites of existing tourism attractions.

5.3.3 Tourist Attitudes to Wind Farms

5.3.3.1 Scottish Tourism Survey 2016

BiGGAR Economics undertook an independent study in 2016, entitled '*Wind Farms and Tourism Trends in Scotland*', to understand the relationship, if any, that exists between the development of onshore wind energy and the sustainable tourism sector in Scotland. In recent years, the onshore wind sector and sustainable tourism sector have grown significantly in Scotland. However, it could be argued that if there was any relationship between the growth of onshore wind energy and tourism, it would be at a more local level. This study therefore considered the evidence at a local authority level and in the immediate vicinity of constructed wind farms.

Eight local authorities had seen a faster increase in wind energy deployment than the Scottish average. Of these, five also saw a larger increase in sustainable tourism employment than the Scottish average, while only three saw less growth than the Scottish average. The analysis presented in this report shows that, at the Local Authority level, the development of onshore wind energy does not have a detrimental impact on the tourism sector. It was found that in the majority of cases (66%) sustainable tourism employment performed better in areas surrounding wind farms than in the wider local authority area. There was no pattern emerging that would suggest that onshore wind farm development has had a detrimental impact on the tourism sector, even at the very local level.

Overall, the conclusion of this study is that published national statistics on employment in sustainable tourism demonstrate that there is no relationship between the development of onshore wind farms and tourism employment at the level of the Scottish economy, at local authority level, nor in the areas immediately surrounding wind farm development. However, the report also concluded that '*Although this study does not suggest that there is any direct relationship between tourism sector growth and wind farm development, it does show that wind farms do not cause a decrease in tourism employment either at a local or a national level.*'

5.3.3.2 Fáilte Ireland Surveys 2007 and 2012

In 2007, Fáilte Ireland in association with the Northern Ireland Tourist Board carried out a survey of domestic and overseas holidaymakers to Ireland in order to determine their attitudes to wind farms. The purpose of the survey was to assess whether the development of wind farms impacts on the enjoyment of the Irish scenery by holidaymakers. The survey involved face-to-face interviews with 1,300 tourists (25% domestic and 75% overseas). The results of the survey are presented in the Fáilte Ireland Newsletter 2008/No.3 entitled '*Visitor Attitudes on the Environment: Wind Farms'*.

The Fáilte Ireland survey results indicate that most visitors are broadly positive towards the idea of building wind farms in Ireland. There exists a sizeable minority (one in seven) however who are negative towards wind farms in any context. In terms of awareness of wind farms, the findings of the survey include the following:

- Almost half of those surveyed had seen at least one wind farm on their holiday to Ireland. Of these, two thirds had seen up to two wind farms during their holiday.
- Typically, wind farms are encountered in the landscape while driving or being driven (74%), while few have experienced a wind farm up close.
- Of the wind farms viewed, most contained less than ten turbines and 15% had less than five turbines.

Regarding the perceived impact of wind farms on sightseeing, the Fáilte Ireland report states:

> *"Despite the fact that almost half of the tourists interviewed had seen at least one wind farm on their holiday, most felt that their presence did not detract from the quality of their sightseeing, with the largest proportion (45%) saying that the presence of the wind farm had a positive impact on their enjoyment of sightseeing, with 15% claiming that they had a negative impact."*

In assessing the perceived impact of wind farms on beauty, visitors were asked to rate the beauty of five different landscapes types: Coastal, Mountain, Farmland, Bogland and Urban Industrial, and then rate on a scale of 1-5 the potential impact of a wind farm being sited in each landscape. The survey found that each potential wind farm must be assessed on its own merits. Overall, however, in looking at wind farm developments in different landscape types, the numbers claiming a positive impact on the landscape due to wind farms were greater than those claiming a negative impact, in all cases.

Regarding the perceived impact of wind farms on future visits to the area, the Fáilte Ireland survey states:

> *"Almost three quarters of respondents claim that potentially greater numbers of wind farms would either have no impact on their likelihood to visit or have a strong or fairly strong positive impact on future visits to the island of Ireland. Of those who feel that a potentially greater number of wind farms would positively impact on their likelihood to visit, the key driver is their support for renewable energy and potential decreased carbon emissions."*

The report goes on to state that while there is a generally positive disposition among tourists towards wind development in Ireland, it is important also to take account of the views of the one in seven tourists who are negatively disposed towards wind farms. This requires good planning on the part of the wind farm developer as well as the Local Authority. Good planning has been an integral component of the Proposed Development throughout the site design and assessment processes. Reference has been made to the '*Planning Guidelines on Wind Energy Development 2006'* in addition to IWEA best practice guidance, throughout all stages, including pre-planning consultation and scoping.

The 2007 survey findings are further upheld by a more recent report carried out by Fáilte Ireland on tourism attitudes to wind farms in 2012. The results of the updated study were published in the 'Fáilte Ireland Newsletter 2012/No.1 entitled 'Visitor Attitudes on the Environment: Wind Farms – Update on 2007 Research'. The updated survey found that of 1,000 domestic and foreign tourists who holidayed in

Ireland during 2012, over half of tourists said that they had seen a wind turbine while travelling around the country. Of this number of tourists, 21% claimed wind turbines had a negative impact on the landscape. However, 32% said that it enhanced the surrounding landscape, while 47% said that it made no difference to the landscape. Almost three quarters of respondents claim that potentially greater numbers of wind farms would either have no impact on their likelihood to visit or have a strong or fairly strong positive impact on future visits to the island of Ireland.

Further details regarding the general public perception of wind energy, including those living in the vicinity of a wind farm, are presented in Section 5.4 below.

5.4 Public Perception of Wind Energy

5.4.1 Sustainable Energy Ireland Surveys 2003 and 2017

5.4.1.1 Background

The results of a national survey entitled '*Attitudes Towards the Development of Wind Farms in Ireland'* were published by the Sustainable Energy Authority of Ireland (SEAI) in 2003. A catchment area survey was also carried out by SEAI (formerly SEI) in order to focus specifically on people living with a wind farm in their locality or in areas where wind farms are planned.

5.4.1.2 Findings

The SEAI survey found that the overall attitude to wind farms is very positive, with 84% of respondents rating it positively or very positively. One percent rates it negatively and 14% had no opinion either way. Approximately two thirds of respondents (67%) were found to be positively disposed to having a wind farm in their locality. Where negative attitudes were voiced towards wind farms, the visual impact of the turbines on the landscape was the strongest influence. The report also notes however that the findings obtained within wind farm catchment areas showed that impact on the landscape is not a major concern for those living near an existing wind farm.

With regards to the economic and environmental impacts of wind farm development, the national survey reveals that attitudes towards wind energy are influenced by a perception that wind is an attractive source of energy:

> *"Over 8 in 10 recognise wind as a non-polluting source of energy, while a similar number believe it can make a significant contribution to Ireland's energy requirements."*

The study reveals uncertainty among respondents with regards to the issues of noise levels, local benefits and the reliability or otherwise of wind power as an energy source. It goes on to state however that the finding that people who have seen wind farms rate these economic and environmental factors more favourably is a further indication that some experience of the structures tends to translate into positive attitudes towards wind energy.

Similar to the national survey, the surveys of those living within the vicinity of a wind farm also found that the findings are generally positive towards wind farms. Perceptions of the impact of the development on the locality were generally positive, with some three-quarters of interviewees believing it had impacted positively.

In areas where a wind farm development had been granted planning permission but was not yet under construction, three quarters of the interviewees expressed themselves in favour of the wind farm being built in their area. Four per cent were against the development. The reasons cited by those who expressed themselves in favour of the wind farm included the fact that wind energy is clean (78%), it would provide local jobs (44%), it would help develop the area (32%) and that it would add to the landscape (13%). Those with direct experience of a wind farm in the locality are generally impressed with it as an additional feature in the landscape. The report states:

> *"It is particularly encouraging that those with experience of wind turbines are most favourable to their development and that wind farms are not solely seen as good in theory, but are also seen as beneficial when they are actually built."*

Few of those living in proximity either to an existing wind farm or one for which permission has been granted believe that the development damages the locality, either in terms of damage to tourism potential or to wildlife. The survey found that there is a clear preference for larger turbines in smaller numbers over smaller turbines in larger numbers.

5.4.1.3 Survey Update 2017

Additionally, a survey carried out by Interactions in October 2017, published by the SEAI, show 47% of Irish adults polled said they were strongly in favour of wind power in Ireland while a further 38% favour it. Overall, this is a 4% increase in favourable attitudes towards wind power compared with similar research in 2013.

The SEAI survey found that the overall attitude to wind farms is very positive, with 84% of respondents in favour of the use of wind energy in Ireland. Approximately two thirds of respondents (70%) would prefer to power their home with renewable energy over fossil fuels, and 45% would be in favour of a wind farm development in their area.

The survey also captured the perceived benefits of wind power among the public. Of those surveyed three quarters selected good for the environment and reduced Carbon Dioxide emissions while fewer people, just over two in three, cited cheaper electricity.

5.4.1.4 Conclusions

The main findings of the SEAI survey indicate that the overall attitude to wind farms is "almost entirely positive". The study highlights that two-thirds of Irish adults are either very favourable or fairly favourable to having a wind farm built in their locality, with little evidence of a "Not In My Back Yard" (NIMBY) effect. The final section of the 2017 report states:

> *"The overwhelming indication from this study is that wind energy enjoys great support and, more specifically, that the development of wind farms is supported and welcomed. The single most powerful indicator of this is to be found among those living in proximity to an existing wind farm: over 60% would be in favour of a second wind farm or an extension of the existing one. This represents a strong vote in favour of wind farm developments – especially important since it is voiced by those who know from direct experience about the impact of such developments on their communities."*

5.4.2 Public Perceptions of Wind Power in Scotland and Ireland Survey 2005

5.4.2.1 Background

A survey of the public perception of wind power in Scotland and Ireland was carried out in 2003/2004 by researchers at the School of Geography & Geosciences, University of St. Andrews, Fife and The Macaulay Institute, Aberdeen ('*Green on Green: Public Perceptions of Wind Power in Scotland and Ireland*', Journal of Environmental Planning and Management, November 2005). The aims of the study were to ascertain the extent to which people support or oppose wind power, to investigate the reasons for these attitudes and to establish how public attitudes relate to factors such as personal experience of operational wind farms and their proximity to them.

5.4.2.2 Study Area

Surveys were carried out at two localities in the Scottish Borders region, one surrounding an existing wind farm and one around a site at which a wind farm had received planning permission but had not yet been built. Surveys were also carried out in Ireland, at two sites in Counties Cork and Kerry, each of which has two wind farms in proximity.

5.4.2.3 Findings

The survey of public attitudes at both the Scottish and Irish study sites concluded that large majorities of people are strongly in favour of their local wind farm, their personal experience having engendered positive attitudes. Attitudes towards the concept of wind energy were described as “overwhelmingly positive” at both study sites in Scotland, while the Irish survey results showed almost full support for renewable energy and 92% support for the development of wind energy in Ireland.

The results of the survey were found to agree with the findings of previous research, which show that positive attitudes to wind power increase through time and with proximity to wind farms. With regards to the NIMBY effect, the report states that where NIMBY-ism does occur, it is much more pronounced in relation to proposed wind farms than actual wind farms. The Scottish survey found that while positive attitudes towards wind power were observed among those living in proximity to both the proposed and existing wind farm sites, people around the proposed site were less convinced than those living in proximity to the existing site. Retrospective questioning regarding pre- and post-construction attitudes at the existing site found that attitudes remained unchanged for 65% of respondents. Of the 24% of people who altered their attitudes following experience of the wind farm, all but one became more positive. The report states:

> *“These results support earlier work which has found that opposition to wind farms arises in part from exaggerated perceptions of likely impact, and that the experience of living near a wind farm frequently dispels these fears. Prior to construction, locals typically expect the landscape impacts to be negative, whereas, once in operation, may people regard them as an attractive addition.”*

The reasons that people gave for their positive attitude to the local wind farm were predominantly of a global kind, i.e., environmental protection and the promotion of renewable energy, together with opposition to a reliance on fossil fuels and nuclear power. Problems that are often cited as negative impacts of wind farms, such as interference with telecommunications and shadow flicker were not mentioned at either site. With regards to those who changed to a more positive attitude following construction of the wind farm, the reasons given were that the wind farm is *“not unattractive (62%), that there was no noise (15%), that community funding had been forthcoming (15%) and that it could be a tourist attraction (8%)”.*

The findings of the Irish survey reinforce those obtained at the Scottish sites with regards to the increase in positive attitudes to wind power through time and proximity to wind farms. The survey of public attitudes at the sites in Cork and Kerry found that the highest levels of support for wind power were recorded in the innermost study zone (0 – 5 kilometres from a point in between the pair of wind farms). The data also suggests that *“those who see the wind farms most often are most accepting of the visual impact”.* The report also states that a previous Irish survey found that most of those with direct experience of wind farms do not consider that they have had any adverse impact on the scenic beauty of the area, or on wildlife, tourism or property values. Overall, the study data reveals *“a clear pattern of public attitudes becoming significantly more positive following personal experience of operational wind farms”.*

With regards to wind farm size, the report notes that it is evident from this and previous research that wind farms with small numbers of large turbines are generally preferred to those with large numbers of smaller turbines.

5.4.2.4 Conclusions

The overall conclusions drawn from the survey findings and from the authors' review of previous studies show that local people become more favourable towards wind farms after construction, that the degree of acceptance increases with proximity to them, and that the NIMBY effect does not adequately explain variations in public attitudes due to the degree of subjectivity involved.

5.4.3 IWEA Interactions Opinion Poll on Wind Energy 2019

Published in January 2020, IWEA undertook a national opinion poll on Wind Energy November 2019 with the objective to "*measure and track public perceptions and attitudes around wind energy amongst Irish adults*." Between November 20th – 30th 2019, a nationally represented sample of 1,019 adults and a booster sample of 200 rural residents participated in an online survey. The 2019 results indicate that 79% of both the nationally represented sample and rural sample strongly favour or favour wind power while 16% of both samples neither favour or oppose it. Amongst those in favour of wind power, the majority cited environmental and climate concerns as their main reasons for supporting such developments. Other reasons cited for supporting wind energy developments include: "economic benefits," "reliable/efficient," "positive experience with wind energy" and recognise it as a "safe resource." When questioned about wind developments in their local area, 55% of nationally represented sample favour or tend to favour such proposals and 51% of the rural population reported the same. Reasons cited for supporting wind developments in their local area include: "good for the environment," "social responsibility," "create jobs," "good for the community."

The IWEA November 2019 survey follows previous national opinion polls on wind energy undertaken in October 2017 and November 2018. The 2019 survey results are consistent with the 2017 and 2018 figures and thus indicate that approximately 4 out of 5 Irish adults have continued to support for wind energy in recent years.

5.5 Health Impacts of Wind Farms

5.5.1 Health Impact Studies

While there are anecdotal reports of negative health effects on people who live very close to wind turbines, peer-reviewed research largely does not support these statements. There is currently no published credible scientific evidence to positively link wind turbines with adverse health effects. The main publications supporting the view that there is no evidence of any direct link between wind turbines and health are summarised below.

1. ***'Wind Turbine Sound and Health Effects – An Expert Panel Review',*** *American Wind Energy Association and Canadian Wind Energy Association, December 2009*

This expert panel undertook extensive review, analysis and discussion of the large body of peer-reviewed literature on sound and health effects in general, and on sound produced by wind turbines in particular. The panel assessed the plausible biological effects of exposure to wind turbine sound. Following review, analysis, and discussion of current knowledge, the panel reached consensus on the following conclusions:

- "There is no evidence that the audible or sub-audible sounds emitted by wind turbines have any direct adverse physiological effects.

- The ground-borne vibrations from wind turbines are too weak to be detected by, or to affect, humans.
- The sounds emitted by wind turbines are not unique. There is no reason to believe, based on the levels and frequencies of the sounds and the panel's experience with sound exposures in occupational settings, that the sounds from wind turbines could plausibly have direct adverse health consequences."

The report found, amongst other things, that:

- "Wind Turbine Syndrome" symptoms are the same as those seen in the general population due to stresses of daily life. They include headaches, insomnia, anxiety, dizziness, etc.
- Low frequency and very low-frequency 'infrasound' produced by wind turbines are the same as those produced by vehicular traffic and home appliances, even by the beating of people's hearts. Such 'infrasounds' are not special and convey no risk factors;
- The power of suggestion, as conveyed by news media coverage of perceived 'wind-turbine sickness', might have triggered 'anticipatory fear' in those close to turbine installations."

2. ***'Wind Turbine Syndrome – An independent review of the state of knowledge about the alleged health condition',*** *Expert Panel on behalf of Renewable UK, July 2010*

This report consists of three reviews carried out by independent experts to update and understand the available knowledge of the science relating to infrasound generated by wind turbines. This report was prepared following the publication of a book entitled '*Wind Turbine Syndrome'*, in 2009 by Dr. Pierpont, which received significant media attention at the time. The report discusses the methodology and assessment carried out in the 2009 publication and assessed the impact of low-frequency noise from wind turbines on humans. The independent review found that:

- "The scientific and epidemiological methodology and conclusions drawn (in the 2009 book) are fundamentally flawed;
- The scientific and audiological assumptions presented by Dr Pierpont relating infrasound to WTD are wrong; and
- Noise from Wind Turbines cannot contribute to the symptoms reported by Dr. Pierpont's respondents by the mechanisms proposed."

Accordingly, the consistent and scientifically robust conclusion remains that there is no evidence to demonstrate any significant health effects in humans arising from noise at the levels of that generated by wind turbines.

3. ***'A Rapid Review of the Evidence',*** *Australian Government National Health and Medical Research Council (NHMRC) Wind Turbines & Health, July 2010*

The purpose of this paper was to review evidence from current literature on the issue of wind turbines and potential impacts on human health and to validate the finding of the 'Wind Turbine Sound and Health Effects - An Expert Panel Review' (see Item 2 above) that:

- "There are no direct pathological effects from wind farms and that any potential impact on humans can be minimised by following existing planning guidelines."
- There is currently no published scientific evidence to positively link wind turbines with adverse health effects.
- 'This review of the available evidence, including journal articles, surveys, literature reviews and government reports, supports the statement that: There are no direct pathological effects from wind farms and that any potential impact on humans can be minimised by following existing planning guidelines."

4. ***'Position Statement on Health and Wind Turbines',*** *Climate and Health Alliance, February 2012*

The Climate and Health Alliance (CAHA) was established in August 2010 and is a coalition of health care stakeholders who wish to see the threat to human health from climate change and ecological degradation addressed through prompt policy action. In its Position Statement in February 2012, CAHA states that:

> *"To date, there is no credible peer reviewed scientific evidence that demonstrates a direct causal link between wind turbines and adverse health impacts in people living in proximity to them. There is no evidence for any adverse health effects from wind turbine shadow flicker or electromagnetic frequency. There is no evidence in the peer reviewed published scientific literature that suggests that there are any adverse health effects from infrasound (a component of low frequency sound) at the low levels that may be emitted by wind turbines."*

The Position Statement explores human perceptions of wind energy and notes that some people may be predisposed to some form of negative perception that itself may cause annoyance. It states that:

> *"Fear and anxious anticipation of potential negative impacts of wind farms can also contribute to stress responses, and result in physical and psychological stress symptoms… Local concerns about wind farms can be related to perceived threats from changes to their place and can be considered a form of "place-protection action", recognised in psychological research about the importance of place and people's sense of identity."*

CAHA notes the existence of *"misinformation about wind power"* and, in particular, states that:

> *"Some of the anxiety and concern in the community stems originally from a self-published book by an anti-wind farm activist in the United States which invented a syndrome, the so-called "wind turbine syndrome". This is not a recognised medical syndrome in any international index of disease, nor has this publication been subjected to peer review."*

CAHA notes that:

> *"Large scale commercial wind farms however have been in operation internationally for many decades, often in close proximity to thousands of people, and there has been no evidence of any significant rise in disease rates."*

This, it states, contrasts with the health impacts of fossil fuel energy generation.

5. ***'Wind Turbine Health Impact Study -Report of Independent Expert Panel' –*** *Massachusetts Departments of Environmental Protection and Public Health (2012)*

An expert panel was established with the objective to, inter alia, evaluate information from peer-reviewed scientific studies, other reports, popular media and public comments and to assess the magnitude and frequency of any potential impacts and risks to human health associated with the design and operation of wind energy turbines. In its final report, the expert panel set out its conclusions under several headings, including noise and shadow flicker.

In relation to noise, the panel concluded that there was limited or no evidence to indicate any causal link between noise from wind turbines and health effects, including the following conclusions:

> *"There is no evidence for a set of health effects, from exposure to wind turbines that could be characterized as a "Wind Turbine Syndrome."*
>
> *The strongest epidemiological study suggests that there is not an association between noise from wind turbines and measures of psychological distress or mental health problems. There*

> *were two smaller, weaker, studies: one did note an association, one did not. Therefore, we conclude the weight of the evidence suggests no association between noise from wind turbines and measures of psychological distress or mental health problems.*
>
> *None of the limited epidemiological evidence reviewed suggests an association between noise from wind turbines and pain and stiffness, diabetes, high blood pressure, tinnitus, hearing impairment, cardiovascular disease, and headache/migraine."*

In relation to shadow flicker, the expert panel found the following:

> *"Scientific evidence suggests that shadow flicker does not pose a risk for eliciting seizures as a result of photic stimulation.*
>
> *There is limited scientific evidence of an association between annoyance from prolonged shadow flicker (exceeding 30 minutes per day) and potential transitory cognitive and physical health effects."*

6. ***Wind Turbines and Health, A Critical Review of the Scientific Literature,*** *Massachusetts Institute of Technology (Journal of Occupational and Environmental Medicine Vol. 56, Number 11, November 2014)*

This review assessed the peer-reviewed literature regarding evaluations of potential health effects among people living in the vicinity of wind turbines. The review posed a number of questions around the effect of turbines on human health, with the aim of determining if stress, annoyance or sleep disturbance occur as a result of living in proximity to wind turbines, and whether specific aspects of wind turbine noise have unique potential health effects. The review concluded the following with regard to the above questions:

- Measurements of low-frequency sound, infrasound, tonal sound emission, and amplitude-modulated sound show that infrasound is emitted by wind turbines. The levels of infrasound at customary distances to homes are typically well below audibility thresholds.
- No cohort or case–control studies were located in this updated review of the peer-reviewed literature. Nevertheless, among the cross-sectional studies of better quality, no clear or consistent association is seen between wind turbine noise and any reported disease or other indicator of harm to human health.
- Components of wind turbine sound, including infrasound and low frequency sound, have not been shown to present unique health risks to people living near wind turbines.
- Annoyance associated with living near wind turbines is a complex phenomenon related to personal factors. Noise from turbines plays a minor role in comparison with other factors in leading people to report annoyance in the context of wind turbines.

A further 25 reviews of the scientific evidence that universally conclude that exposure to wind farms and the sound emanating from wind farms does not trigger adverse health effects, were compiled in September 2015 by Professor Simon Chapman, of the School of Public Health and Sydney University Medical School, Australia, and is included as Appendix 5-1 of this EIAR. Another recent publication by Chapman and Crichton (2017) entitled '*Wind turbine syndrome; A communicated disease'* critically discusses why certain health impacts might often be incorrectly attributed to wind turbines.

7. ***Position Paper on Wind Turbines and Public Health:*** *HSE Public Health Medicine Environment and Health Group, February 2017*

The Health Service Executive (HSE) position paper on wind turbines and public health was published in February 2017 to address the rise in wind farm development and concerns regarding potential impacts on public health. The paper discusses previous observations and case studies which describe a broad range of health effects that are associated with wind turbine noise, shadow flicker and electromagnetic radiation.

A number of comprehensive reviews conducted in recent years to examine whether these health effects are proven has highlighted the lack of published and high-quality scientific evidence to support adverse effects of wind turbines on health.

The HSE position paper determines that current scientific evidence on adverse impacts of wind farms on health is weak or absent. Further research and investigative processes are required at a larger scale in order to be more informative for identifying potential health effects of exposure to wind turbine effects. They advise developers on making use of the Draft Wind Energy Development Guidelines (2006), as a means of setting noise limits and set back distances from the nearest dwellings.

8. ***Environmental Noise Guidelines for the European Region:*** *World Health Organisation Regional Office for Europe, 2018.*

The WHO Environmental Noise Guidelines provide recommendations for protecting human health from exposure to environmental noise originating from various sources such as transportation noise, wind turbine noise and leisure noise. The Guideline Development Group (GDG) defined priority health outcomes and from this were able to produce guideline exposure levels for noise exposure.

For average noise exposure, the GDG conditionally recommends reducing noise levels produced by wind turbines below 45 dB Lden. The GDG recognise the potential for increased risk of annoyance at levels below this value but cannot determine whether this increased risk can impact health. Wind turbine noise above this level is associated with adverse health effects.

The GDG points out that evidence on health effects from wind turbine noise (apart from annoyance) is either absent or rated low/very low quality. Furthermore, public perception towards wind turbines are hard to differentiate from reported effects related to noise and the two may be inextricably linked. The GDG also recognises that the percentage of people exposed to noise from wind turbines is far lower than other sources such as road traffic and state that any benefit from specifically reducing population exposure to wind turbine noise in all situations remains unclear.

That being said, the GDG recommends renewable energy policies include provisions to ensure noise levels from wind farm developments do not rise above the guideline values for average noise exposure. The GDG also provides a conditional recommendation for the implementation of suitable measures to reduce noise exposure, however, it states that no evidence is available to facilitate the recommendation of one type of intervention over another.

9. ***Infrasound Does Not Explain Symptoms Related to Wind Turbines:*** *Finnish Government's Analysis, Assessment and Research Activities (VN TEAS), 2020*

The study targeted to adverse health effects of wind turbine infrasound and was funded by the Finnish Government's Analysis, Assessment and Research Activities (VN TEAS).

It was found that the low-frequency, inaudible sounds made by wind turbines are not damaging to human health despite fears that they cause unpleasant symptoms. The project, which was carried out over two years, examined the impact of low-frequency—or infrasound—emissions which cannot be picked up by the human ear.

People in many countries have blamed the infrasound waves for symptoms ranging from headaches and nausea to tinnitus and cardiovascular problems, researchers said.

Interviews, sound recordings and laboratory tests were used to explore possible health effects on people living within 20 kilometres (12 miles) of the generators.

The report notes:

> *'...the behavioral findings of the current study suggest that wind turbine infrasound cannot be reliably perceived and it does not result in increased annoyance. Participants that showed health effects did not show signs of increased infrasound sensitivity and did not rate wind turbine sounds more annoying.*

As a result:

> *'These findings do not support the hypothesis that infrasound is the element in turbine sound that causes annoyance. Instead, they suggest that people who have health symptoms which they associate with wind turbine sound are not likely to have these symptoms because they perceive turbine sound more annoying than controls, at least in laboratory settings. It is more likely that these symptoms are triggered by other factors such as symptom expectancy'.*

5.5.2 Turbine Safety

Turbines pose no threat to the health and safety of the general public. The Department of the Environment, Heritage and Local Government (DoEHLG)'s '*Wind Energy Development Guidelines for Planning Authorities 2006*' iterate that there are no specific safety considerations in relation to the operation of wind turbines. Fencing or other restrictions are not necessary for safety considerations and should be kept to a minimum. People or animals can safely walk up to the base of the turbines.

The adopted 2006 Guidelines state that there is a very remote possibility of injury to people from flying fragments of ice or from a damaged blade. However, most blades are composite structures with no bolts or separate components and the danger is therefore minimised. The build-up of ice on turbines is unlikely to present problems. The wind turbines will be fitted with anti-vibration sensors, which will detect any imbalance caused by icing of the blades. The sensors will cause the turbine to wait until the blades have been de-iced prior to resuming operation.

Turbine blades are manufactured of glass reinforced plastic which will prevent any likelihood of an increase in lightning strikes within the Proposed Development site or the local area. Lightning protection conduits will be integral to the construction of the turbines. Lightning conduction cables, encased in protection conduits, will follow the electrical cable run, from the nacelle to the base of the turbine. The conduction cables will be earthed adjacent to the turbine base. The earthing system will be installed during the construction of the turbine foundations.

5.5.3 Electromagnetic Interference

The provision of underground electric cables of the capacity proposed is common practice throughout the country and installation to the required specification does not give rise to any specific health concerns.

The extremely low frequency (ELF) electric and magnetic fields (EMF) associated with the operation of the proposed cables fully comply with the international guidelines for ELF-EMF set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP), a formal advisory agency to the World Health Organisation, as well as the EU guidelines for human exposure to EMF. Accordingly, there will be no operational impact on properties (residential or other uses) as the ICNIRP guidelines will not be exceeded at any distances even directly above the cables.

The EirGrid document '*EMF & You: Information about Electric & Magnetic Fields and the electricity transmission system in Ireland'* (EirGrid, 2014) provides further practical information on EMF and is included as Appendix 5-2 of this EIAR.

Further details on the potential impacts of electromagnetic interference to telecommunications and aviation are presented in Chapter 14: Material Assets.

5.5.4 Assessment of Effects on Human Health

As set out in the Department of Housing, Planning, Community and Local Government '*Key Issues Consultation Paper on the Transposition of the EIA Directive 2017*' and the guidance listed in Section 1.2.2 of Chapter 1: Introduction, the consideration of the effects on populations and on human health should focus on health issues and environmental hazards arising from the other environmental factors, for example water contamination, air pollution, noise, accidents, disasters.

Chapter 8: Land, Soils and Geology, Chapter 9: Water, Chapter 10: Air and Climate, Chapter 11: Noise and Vibration and Chapter 14: Material Assets (Traffic and Transport) provide an assessment of the effects of the Proposed Development on these areas of consideration. As this wind farm is already operational and requires no additional infrastructure, concerns surrounding negative effects associated with the construction phase of the wind farm do not apply. On this basis, the potential for negative health effects associated with the Proposed Development is imperceptible.

The proposed site design and mitigation measures outlined in Chapter 8 and Chapter 9 ensures that the potential for impacts on the water environment are not significant. No impacts on local water supplies are anticipated.

As set out in Chapter 9, potential health effects are associated with negative impacts on public and private water supplies and potential flooding. There are no mapped public or group groundwater scheme protection zones in the area of the Proposed Development.

The preliminary Flood Risk Assessment has also shown that due to the elevated nature of the site, there is no risk of flooding at the Proposed Development.

A wind farm is not a recognised source of pollution. It is not an activity which requires Environmental Protection Agency licensing under the Environmental Protection Agency Act 1992, as amended. As such, a wind farm is not considered to have ongoing significant emissions to environmental media and the subsequent potential for human health effects.

The proposed project is for the extension of duration of a wind farm, capable of offsetting carbon emissions associated with the burning of fossil fuels. During the operational phase, the wind farm has had, and will continue to have a long term, significant, positive effect on air quality, as set out in Chapter 10, which will contribute to positive effects on human health.

The provision of aviation lighting on permitted turbines is a standard and accepted part of any wind farm development. As such, aviation lighting is already in place on the turbines in this wind farm. This is a safety requirement of the Irish Aviation Authority (IAA). The standard lighting required by the IAA are medium intensity lights. Such lighting is designed specifically for aviation safety and is not intended to be overbearing or dominant when viewed from the ground thus striking a reasonable balance between aviation safety and visual impact. The IAA generally only confirm lighting arrangements required for wind farm developments once a consent is in place.

It is considered that aviation lighting on the proposed turbine will have no significant effect on human health, beyond increasing aircraft safety in the context of the Proposed Development. The applicant will continue its engagement with IAA as required in relation to aviation lighting.

5.5.5 Vulnerability of the Project to Natural Disasters and Major Accidents

As outlined in Section 5.5.4 above, a wind farm is not a recognised source of pollution. Should a major accident or natural disaster occur, the potential sources of pollution on-site during the operational and decommissioning phases, are limited. Sources of pollution with the potential to cause significant environmental pollution and associated negative effects on health, such as bulk storage of hydrocarbons or chemicals, storage of wastes etc., are limited.

There is limited potential for significant natural disasters to occur at the Proposed Development site. Ireland is a geologically stable country with a mild temperate climate. The potential natural disasters that may occur are therefore limited to flooding and fire. Flooding is addressed in Chapter 9: Hydrology and Hydrogeology. It is considered that the risk of significant fire occurring, affecting the wind farm and causing the wind farm to have significant environmental effects is limited and therefore a significant effect on human health is similarly limited. As described earlier, there are no significant sources of pollution in the wind farm with the potential to cause environmental or health effects. Also, the spacing of the turbines and distance of turbines from any properties limits the potential for impacts on human health. The issue of turbine safety is addressed in Section 5.5.2.

Major industrial accidents involving dangerous substances pose a significant threat to humans and the environment; such accidents can give rise to serious injury to people or serious damage to the environment, both on and off the site of the accident. The Proposed Development site is not regulated or connected to or close to any site regulated under the Control of Major Accident Hazards Involving Dangerous Substances Regulations i.e., SEVESO sites and so there are no potential effects from this source.

5.6 Property Values

In the absence of any Irish studies on the effect of wind farms on property values, this section provides a summary of the largest and most recent studies from the United States and Scotland.

The largest study of the impact of wind farms on property values has been carried out in the United States. '*The Impact of Wind Power Projects on Residential Property Values in the United States: A multi-Site Hedonic Analysis*', December 2009, was carried out by the Lawrence Berkley National Laboratory (LBNL) for the U.S Department of Energy. This study collected data on almost 7,500 sales of single-family homes situated within ten miles of 24 existing wind farms in nine different American states over a period of approximately ten years. The conclusions of the study are drawn from eight different pricing models including repeat sales and volume sales models. Each of the homes included in the study was visited to demonstrate the degree to which the wind facility was visible at the time of the sale, and the conclusions of the report state that "The result is the most comprehensive and data rich analysis to date on the potential impacts of wind energy projects on nearby property values."

The main conclusion of this study is as follows:

> *"Based on the data and analysis presented in this report, no evidence is found that home prices surrounding wind facilities are consistently, measurably, and significantly affected by either the view of wind facilities or the distance of the home to those facilities. Although the analysis cannot dismiss the possibility that individual or small numbers of homes have been or could be negatively impacted, if these impacts do exist, they are either too small and/or too infrequent to result in any widespread and consistent statistically observable impact."*

This study has been recently updated by LBNL who published a further paper entitled '*A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States*', in August 2013. This study analysed more than 50,000 home sales near 67 wind farms in

27 counties across nine U.S. states yet was unable to uncover any impacts to nearby home property values. The homes were all within 10 miles of the wind energy facilities - about 1,100 homes were within 1 mile, with 331 within half a mile. The report is therefore based on a very large sample and represents an extremely robust assessment of the impacts of wind farm development on property prices. It concludes that:

> *"Across all model Specifications, we find no statistical evidence that home prices near wind turbines were affected in either the post-construction or post announcement/pre-construction periods."*

Both LBNL studies note that their results do not mean that there will never be a case of an individual home whose value goes down due to its proximity to a wind farm – however if these situations do exist, they are considered to be statistically insignificant. Therefore, although there have been claims of significant property value impacts near operating wind turbines that regularly surface in the press or in local communities, strong evidence to support those claims has failed to materialise in all the major U.S. studies conducted thus far.

A further study was commissioned by RenewableUK and carried out by the Centre for Economics and Business Research (Cebr) in March 2014. Its main conclusions are:

- Overall, the analysis found that the county-wide property market drives local house prices, not the presence or absence of wind farms.
- The econometric analysis established that construction of wind farms at the five sites examined across England and Wales has not had a detectable negative impact on house price growth within a five-kilometre radius of the sites.

A relatively new study issued in October 2016 '*Impact of wind Turbines on House Prices in Scotland'* (2016) was published by Climate Exchange. Climate Exchange is Scotland's independent centre of expertise on climate change which exists to support the Scottish Governments policy development on climate and the transition to a low carbon economy. A copy of the report is included as Appendix 5-3 of this EIAR.

The report presents the main findings of a research project estimating the impact on house prices from wind farm developments. It is based on analysis of over 500,000 property sales in Scotland between 1990 and 2014. The key findings from the study are:

- No evidence of a consistent negative effect on house prices: Across a very wide range of analyses, including results that replicate and improve on the approach used by Gibbons (2014), we do not find a consistent negative effect of wind turbines or wind farms when averaging across the entire sample of Scottish wind turbines and their surrounding houses. Most results either show no significant effect on the change in price of properties within 2km or 3km or find the effect to be positive.
- Results vary across areas: The results vary across different regions of Scotland. Our data does not provide sufficient information to enable us to rigorously measure and test the underlying causes of these differences, which may be interconnected and complex.

Although there have been no empirical studies carried out in Ireland on the impacts of wind farms on property prices, the literature described above demonstrates that at an international level, wind farms have not impacted property values in the local areas. It is a reasonable assumption based on the available international literature, that the continued operation of the Proposed Development would not impact on the property values in the area.

5.7 Shadow Flicker

5.7.1 Background

Shadow flicker is an effect that occurs when rotating wind turbine blades cast shadows over a window in a nearby property. Shadow flicker is an indoor phenomenon, which may be experienced by an occupant sitting in an enclosed room when sunlight reaching the window is momentarily interrupted by a shadow of a wind turbine's blade. Outside in the open, light reaches a viewer (person) from a much less focused source than it would through a window of an enclosed room, and therefore shadow flicker assessments are typically undertaken for the nearby adjacent properties around a proposed wind farm site.

The frequency of occurrence and the strength of any potential shadow flicker impact depends on several factors, each of which is outlined below.

1. ***Whether the sunlight is direct and unobstructed or diffused by clouds:***

If the sun is not shining, shadow flicker cannot occur. Reduced visibility conditions such as clouds, haze, and fog greatly reduce the chance of shadow flicker occurring.

Cloud amounts are reported as the number of eights (okta) of the sky covered. Irish skies are completely covered by cloud for over 50% of the time. The mean cloud amount for each hour is between five and six okta. This is due to Ireland's geographical position off the northwest of Europe, close to the path of Atlantic low-pressure systems which tend to keep the country in humid, cloudy airflows for much of the time. A study at 12 stations over a 25-year period showed that the mean cloud amount was at a minimum in April and maximum in July. Cloud amounts were less at night than during the day, with the mean minimum occurring roughly between 2100 and 0100 GMT and the mean maximum occurring between 1000 and 1500 GMT at most stations. (*Source: Met Éireann, www.met.ie*)

2. ***The presence of intervening obstructions between the turbine and the observer:***

For shadow flicker to occur, the windows of a potentially affected property must have direct visibility of a wind turbine, with no physical obstructions such as buildings, trees and hedgerows, hills or other structures located on the intervening land between the window and the turbine.

Any obstacles such as trees or buildings located between a property and the wind turbine will reduce or eliminate the occurrence and/or intensity of the shadow flicker.

3. ***How high the sun is in the sky at a given time:***

At distances of greater than approximately 500m between a turbine and a receptor, shadow flicker generally occurs only at sunrise or sunset when the shadow cast by the turbine is longer. The current adopted 'Wind Energy Development Guidelines for Planning Authorities' published by the Department of Environment, Heritage and Local Government (DoEHLG) in 2006, iterates that at distances greater than ten rotor diameters from a turbine, the potential for shadow flicker is very low (*'Wind Energy Development Guidelines for Planning Authorities'*, DoEHLG, 2006).

Figure 5-4 illustrates the shadow cast by a turbine at various times during the day; the red shading represents the area where shadow flicker may occur. When the sun is high in the sky, the length of the shadow cast by the turbine is significantly shorter.

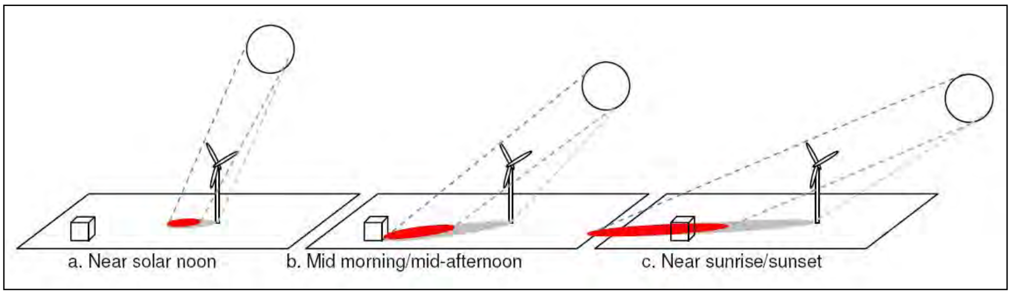


Figure 5-4 Shadow-Prone Area as Function of Time of Day (Source: Shadow Flicker Report, Helimax Energy, Dec 2008)

4. *Distance and bearing, i.e. where the property is located relative to a turbine and the sun:*

The further a property is from the turbine the less pronounced the impact will be. There are several reasons for this: there are fewer times when the sun is low enough to cast a long shadow; when the sun is low it is more likely to be obscured by either cloud on the horizon or intervening buildings and vegetation; and, the centre of the rotor's shadow passes more quickly over the land reducing the duration of the impact.

At a distance, the turbine blades do not cover the sun but only partly mask it, substantially weakening the shadow. This impact occurs first with the shadow from the blade tip, the tips being thinner in section than the rest of the blade. The shadows from the tips extend the furthest and so only a very weak impact is observed at distance from the turbines. (Source: Update of Shadow Flicker Evidence Base, UK Department of Energy and Climate Change, 2010).

5. *Property usage and occupancy:*

Where shadow flicker is predicted to occur at a specific location, this does not imply that it will be witnessed. Potential occupants of a property may be sleeping or occupying a room on another side of the property that is not subject to shadow flicker, or completely absent from the location during the time of shadow flicker events. As shadow flicker usually occurs only when the sun is at a low angle in the sky, i.e. very early in the morning after sunrise or late in the evening before sunset, even if there is a bedroom on the side of the property affected, the shadow flicker may not be witnessed if curtains or blinds in the bedroom are closed.

6. *Wind direction, i.e. position of the turbine blades:*

The direction of wind turbine blades changes according to wind direction, as the turbine rotor turns to face the wind. In order to cast a shadow, the turbine blades must be facing directly toward or away from the sun, so they are moving across the source of the light relative to the observer. This is demonstrated in Figure 5-6 below.

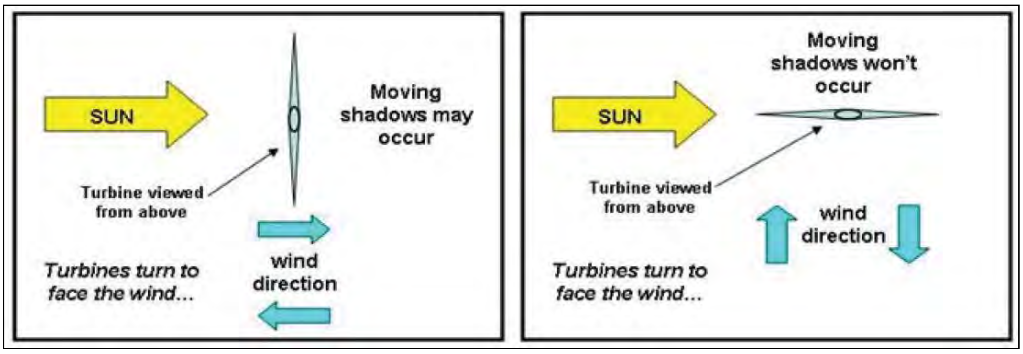


Figure 5-5 Turbine Blade Position and Shadow Flicker Impact (Source: Wind Fact Sheet: Shadow Flicker, Noise Environment Power LLC)

7. ***Rotation of turbine blades:***

Shadow flicker occurs only if there is sufficient wind for the turbine blades to be continually rotating. Wind turbines begin operating at a specific wind speed referred to as the 'cut-in speed', i.e. the speed at which the turbine produces a net power output, and they cease operating at a specific 'cut-out speed'. Therefore, even during the sunlight hours when shadow flicker has been predicted to occur, if the turbine blades are not turning due to insufficient wind speed, no shadow flicker will occur.

5.7.2 Guidance

The current, adopted guidance for shadow flicker in Ireland is derived from the *2006 Wind Energy Development Guidelines (WEDG)*, and the '*Best Practice Guidelines for the Irish Wind Energy Industry'* (Irish Wind Energy Association, 2012).

The DoEHLG 2006 wind energy guidelines recommend that shadow flicker should not exceed a total 30 hours per year or 30 minutes per day of shadow flicker at any property within 500 metres of a proposed turbine. There are 4 no. private residential dwellings within 500m of the existing turbines, which is the recommended minimum setback distance as per the current *2006 Wind Energy Development Guidelines (WEDG).* The closest third-party property (inhabitable dwelling) to the Proposed Development is located approximately 297m from the closest turbine (T5).

The DoEHLG guidelines state that shadow flicker lasts only for a short period of time and occurs only during certain specific combined circumstances, as follows:

- the sun is shining and is at a low angle in the sky, i.e., just after dawn and before sunset, and
- the turbine is located directly between the sun and the affected property, and
- there is enough wind energy to ensure that the turbine blades are moving, and
- the turbine blades are positioned so as to cast a shadow on the receptor.

Although the DoEHLG thresholds apply to dwellings located within 500 metres of a proposed turbine location, for the purposes of this assessment, all properties located within 520m (i.e., recommended distanced of ten times rotor diameters (10 X 52 = 520m) of the existing turbines (as per IWEA guidelines, 2012[4]) have been considered. The DoEHLG Guidelines state that at distances greater than 10 rotor diameters from a turbine, the potential for shadow flicker is very low.

The adopted 2006 DoEHLG guidelines are currently under review. The Department of Housing, Planning and Local Government (DoHPLG) released the '*Draft Revised Wind Energy Development Guidelines'* in December 2019 which was released for public consultation. The Draft 2019 guidelines recommend local planning authorities and/or An Bord Pleanála impose conditions to ensure that:

> *"no existing dwelling or other affected property will experience shadow flicker as a result of the wind energy development subject of the planning application and the wind energy development shall be installed and operated in accordance with the shadow flicker study submitted to accompany the planning application, including any mitigation measures required."*

The Draft 2019 Guidelines are based on the recommendations set out in the '*Proposed Revisions to Wind Energy Development Guidelines 2006 – Targeted Review'* (December 2013) and the '*Review of the Wind Energy Development Guidelines 2006 – Preferred Draft Approach'* (June 2017).

The assessment herein is based on compliance with the 2006 guidelines limit of 30 hours per year or 30 minutes per day. However, it should also be noted the Proposed Development can be brought in line

[4] *Irish Wind Energy Association (2012) - Best Practice Guideline for the Irish Wind Energy Industry.*

with the requirements of the 2019 Draft Guidelines through the implementation of the mitigation measures outlined in Section 5.9.3.4, should the draft guidelines be adopted as currently proposed.

The applicant is aware that the Department of the Environment, Heritage and Local Government (DoEHLG) Wind Energy Development Planning Guidelines (2006) are currently being revised. The assessment herein is based on compliance with the DoEHLG 2006 Guidelines limit (30 hours per year or 30 minutes per day).

5.7.3 Shadow Flicker Prediction Methodology

Shadow flicker occurs only under certain, combined circumstances, as detailed above. Where shadow flicker does occur, it is generally short-lived. The DoEHLG guidelines state that careful site selection, design and planning, and good use of relevant software can help avoid the possibility of shadow flicker, all of which have been employed at the Proposed Development site. Proper siting of wind turbines is key in eliminating shadow flicker.

The occurrence of shadow flicker can be precisely predicted using specialist computer software programmes specifically developed for the wind energy industry, such as WindFarm (ReSoft) or WindFarmer (DNV.GL) or AWS OpenWind. The computer modelling of the occurrence and magnitude of shadow flicker is made possible by the fact that the sun rises and sets in the same position in the sky on every day each year.

Any potential impact can be precisely modelled to give the start and end time (accurate to the second) of any incidence of shadow flicker, at any location, on any day and all days of the year when it might occur. Where a shadow flicker impact is predicted to occur, the total maximum daily and annual durations can be predicted, along with the total number of days. Any incidence of predicted shadow flicker can be attributed to a particular turbine or group of turbines to allow effective mitigation strategies to be planned and proposed where necessary as detailed further below.

For the purposes of this shadow flicker assessment, the software package Wind Farm Version 5.0.1.2 has been used to predict the level of shadow flicker associated with the permitted wind turbines. Wind Farm is a commercially available software tool that enables developers to analyse, design and optimise proposed wind farms. It allows proposed turbine layouts to be optimised for maximum energy yield whilst taking account of environmental, planning and engineering constraints.

5.7.4 Shadow Flicker Assessment Criteria

5.7.4.1 Turbine Dimensions

Planning permission is being sought for the extension of duration for a further 15 years of operation of 13 No. turbines, of size envelope with a tip height of 75m above the top of the foundation. For the purposes of this assessment, a turbine with a rotor diameter of 52 meters and a hub height of 49 meters was modelled in order to assess the turbines as they exist currently in this wind farm with regard to accurate blade length.

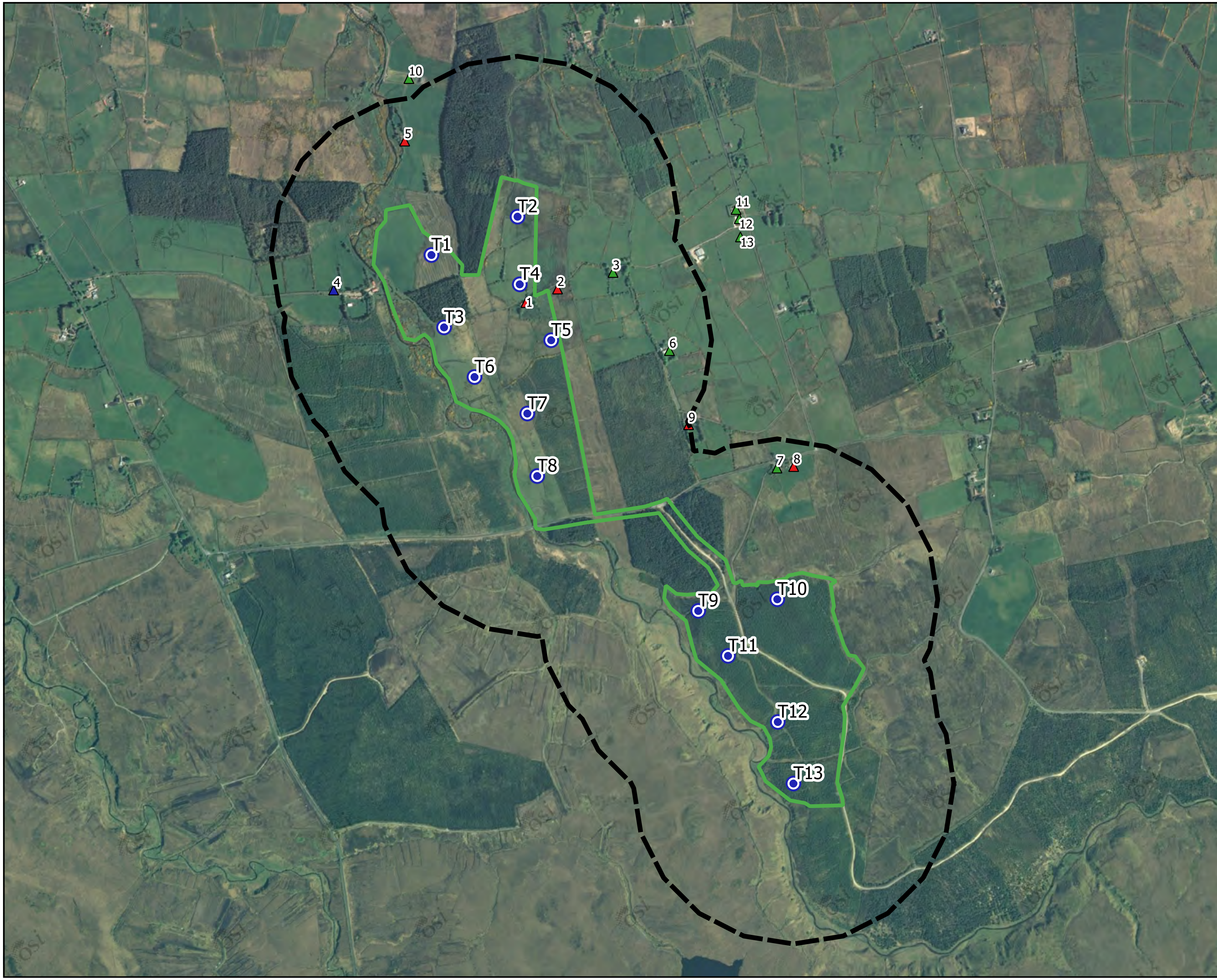
With the benefit of the mitigation measures outlined in Section 5.9.3.4, all turbines installed on-site will comply with the current adopted 2006 DoEHLG guideline thresholds of 30 minutes per day, or 30 hours per year, or with any revised guidelines if required. This will be achieved through the use of turbine control software throughout the entire operational period of the Proposed Development.

5.7.4.2 Study Area

The study area for the shadow flicker assessment is 520m, which is ten times the rotor diameter from each turbine, as set out in the 'Wind Energy Guidelines for Planning Authroities', DoEHLG, 2006 guidelines. All residential properties located within 520 metres have been included in the assessment. In addition, a planning history search to identify properties that may have been granted planning permission, but not yet constructed, was carried out. Any property with a valid planning permission for a dwelling house was also addressed to the sensitive receptors dataset for shadow flicker modelling.

The closest property to the Proposed Development is a derelict property which is located approximately 63 metres (m) from the nearest existing turbine (T4). The closest inhabitable dwelling to the Proposed Development is a third-party dwelling which is located approximately 297m from the nearest existing turbine (T4). The closest participating property to the Proposed Development is located approximately 336.5m from the existing turbine (T1).

As previously stated, the closest third-party property to the Proposed Development (H3) is located approximately 297 meters from the closest existing turbine (T4). This is slightly less than 4 times the existing turbine tip height (4 x 75 = 300m). There are 9 no. properties located within 520m of the existing turbines (i.e. shadow flicker study area recommended by DoEHLG). Four of these properties are inhabitable dwellings, and the remaining 5 are derelict buildings. The shadow flicker study area and sensitive receptor locations are shown in Figure 5-7.



Drawing Title
Shadow Flicker Study Area

Project Title
Dunneill Wind Farm

Drawn By	Checked By
SND	TB
Project No. 210207	Drawing No. Figure 5-6
Scale 1:16000	Date 09.08.2022

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5.7.4.3 Assumptions and Limitations

Due to the latitude of Ireland and the UK, shadow flicker impacts are only possible at properties 130 degrees either side to the north as turbines do not cast shadows on their southern side (ODPM Annual Report and Accounts 2004: Housing, Planning, Local Government and the Regions Committee; Planning Policy Statement 22). As such properties located outside of this potential shadow flicker zone will not be impacted.

However, in this assessment, all 9 no. properties within 520m and 360 degrees of the Proposed Development within the study area were assessed for shadow flicker impact.

At each property, shadow flicker calculations were carried out based on 4 no. notional windows facing north, east, south and west, labelled Windows 1, 2, 3 and 4 respectively. The degrees from north value for each window is:

- Window 1: 0 degrees from North
- Window 2: 90 degrees from North
- Window 3: 180 degrees from North
- Window 4: 270 degrees from North

Each window measures one-metre-high by one-metre-wide, and tilt angle is assumed to be zero. The centre height of each window is assumed to be two metres above ground level and no screening due to trees or other buildings or vegetation is assumed. It was not considered necessary or practical to measure the dimensions of every window on every property in the study area. While the actual size of a window will marginally influence the incidence and duration of any potential shadow flicker impact, with larger windows resulting in slightly longer shadow flicker durations, any incidences or durations or shadow flicker can be countered by the measures outlined in Section 5.9.3.4 below.

The use of computer models to predict the amount of shadow flicker that will occur is known to produce an over-estimate of possible impact, referred to as the 'worst-case impact', due to the following limitations:

- The sun is assumed to be shining during all daylight hours such that a noticeable shadow is cast. This will not occur in reality.
- The wind is always assumed to be within the operating range of the turbines such that the turbine rotor is turning at all times, thus enabling a periodic shadow flicker. Wind turbines only begin operating at a specific 'cut-in speed', and cease operating at a specific 'cut-out speed'. In periods where the wind is blowing at medium to high speeds, the probability of there being clear or partially clear skies where the sun is shining and could cast a shadow, is low.
- The wind turbines are assumed to be available to operate, i.e. turned on at all times. In reality, turbines may be switched off during maintenance or for other technical or environmental reasons.
- The turbine rotor is considered (as a sphere) to present its maximum aspect to observers in all directions. In reality, the wind direction and relative position of the turbine rotor would result in a changing aspect being presented by the turbine. The rotor will actually present as ellipses of varying sizes to observers from different directions. The time taken for the sun to pass across the sky behind a highly elliptical rotor aspect will be shorter than the modelled maximum aspect.

The total annual shadow flicker calculated for each property assumes 100% sunshine during daytime hours, as referred to above. However, weather data for this region shows that the sun shines on average for 24% of the daylight hours per year. This percentage is based on Met Eireann data recorded at Claremorris, the closest weather station with long-term data, over the 30-year period from 1971 to 2000 (www.met.ie). The actual sunshine hours at the proposed development site and therefore the percentage of time shadow flicker could actually occur is 24% of daylight hours. Table 5-9 below therefore lists the annual shadow flicker calculated for each property when the regional average of 24% sunshine is taken into account, to give a more accurate annual average shadow flicker prediction.

Table 5-9 below also outlines whether a shadow flicker mitigation strategy is required for each property to mitigate potential exceedances of the daily and/or annual threshold figure.

5.7.5 Shadow Flicker Assessment Results

5.7.5.1 Daily and Annual Shadow Flicker

The WindFarm computer software was used to model the predicted daily and annual shadow flicker levels in significant detail, identifying the predicted daily start and end times, maximum daily duration and the individual turbines predicted to give rise to shadow flicker.

The model results assume worst-case conditions, including

- 100% sunshine during all daylight hours throughout the year,
- An absence of any screening (vegetation or other buildings),
- That the sun is behind the turbine blades,
- That the turbine blades are facing the property, and
- That the turbine blades are moving.

The maximum daily shadow flicker model assumes that daylight hours consist of 100% sunshine. This is a conservative assumption which represents a worst-case scenario. Following the detail provided above on sunshine hours, a sunshine factor of 24% has been applied to the annual shadow flicker results. Taking this information into consideration, the predicted shadow flicker which is estimated to occur at nearby dwellings is presented in Table 5-9.

The predicted maximum daily and annual shadow flicker levels are then considered in the context of the DoEHLG's guideline daily threshold of 30 minutes per day and annual threshold of 30 hours per year. If there is a predicted exceedance of the threshold limits at any property, the turbines that contribute to the exceedance are also identified.

The recommended study area for shadow flicker impact assessment is ten times the rotor, which in the case of the Proposed Development is 520 meters (52x10). There are 9 No. properties within 520m of the existing Dunneill turbines.

All 9 No. properties have been modelled as part of the shadow flicker assessment, the results of which are presented in Table 5-9 below. Former residential dwellings termed as "derelict" within this assessment are defined as properties that are in an uninhabitable condition. Planning permissions which have been secured to construct residential dwellings, but at the time of preparation of this EIAR, had not commenced construction, have also been considered as it is possible that they will be inhabited during the operation of the windfarm. Following a detailed planning search no residential planning applications within the study area were identified.

Table 5-9 Maximum Potential Daily & Annual Shadow Flicker – Dunneill Wind Farm

House ID	ITM (Easting)	ITM (Northing)	Description	Distance to Nearest Turbine (metres)	Nearest Turbine No.	Max. Daily Shadow Flicker: Pre-Mitigation (hrs:min:sec)	Max. Annual Shadow Flicker: Pre-Mitigation (hrs:min:sec)	Max. Annual Shadow Flicker Adjusted for Average Regional Sunshine (hrs:min:sec)	Turbine(s) Giving Rise to Shadow Flicker Exceedance	Mitigation Strategy Required (Daily)	Mitigation Strategy Required (Annual)
1	544427	829970	Derelict	63	T4	01:44:24	21:54:00	21:52:26	T1, T3, T5, T6	No*	No
2	544531	830014	Derelict	124.9	T4	01:55:48	01:00:00	03:57:35	T1, T3, T4, T5, T6	No*	No
3	544709	830068	Dwelling	297	T5	01:07:48	04:12:00	18:05:08	T2, T4, T5	Yes	No
4	543805	830011	Participating Property	336	T1	00:52:48	06:12:00	00:58:40	T1, T3	No**	No
5	544034	830492	Derelict	377	T1	00:54:36	10:24:00	14:16:23	T2	No*	No
6	544892	829815	Dwelling	384	T5	00:35:24	06:54:00	19:16:59	T5	Yes	No
7	545241	829434	Dwelling	425	T10	00:33:36	03:30:00	06:43:16	Combination of T9 and T10	Yes	No
8	545295	829438	Derelict	433	T10	00:24:36	23:42:00	05:47:32	N	No	No
9	544954	829574	Derelict	517.9	T8	00:30:36	21:54:00	18:50:36	Combination of T4 and T5	No*	No

* A mitigation strategy is not considered necessary on a property that is derelict
** Participating Property/Landowner with successful mitigation strategy currently in place

There are 9 No. properties within the shadow flicker study area (i.e., 520m of the existing Dunneill turbines, which is ten times the rotor diameter of turbines as recommended in 2019 Draft Wind Energy Guidelines).

Of these 9 No. properties:

- 3 No. properties are third party inhabitable dwellings;
- 1 No. property is a participating property/landowner; and
- 5 No. properties are derelict properties.

Properties which are in a derelict condition (i.e., uninhabitable) will not require mitigation measures to be employed. The 3 no. third-party dwellings located within the study area have predicted shadow flicker occurrences, which will be mitigated against. Additionally, it is worth reiterating that the predicted shadow flicker listed in Table 5-9 is considered conservative and in reality, the occurrence and/or duration of shadow flicker at these properties is likely to be eliminated or significantly reduced as the following items are not considered by the model:

- Receivers may be screened by topography, cloud cover and/or vegetation/built form i.e., adjacent buildings, farm buildings, garages or barns;
- Each receiver will not have windows facing in all directions onto the wind farm.

Section 5.9.3.4 below outlines the mitigation strategies which may be employed at the potentially affected properties to ensure that the current Wind Energy Guidelines, 2006 are complied with at any dwelling within the 520m study area.

5.7.5.2 Cumulative Shadow Flicker

For the assessment of cumulative shadow flicker, any other existing, permitted or proposed wind farm developments would be considered where it is located within two kilometres of the proposed turbines, and where dwellings included in the shadow flicker assessment were within 10 rotor diameters of both the existing turbines, or other existing, permitted or proposed wind farms. The closest permitted, proposed, or operational wind farm to the Proposed Development is the Kingsmountain Wind Farm, which is located approximately 2.1 km southeast of the Proposed Development. At this distance cumulative shadow flicker impacts are not anticipated. At the time of writing this report, there are no further wind farm developments which are in the planning stage that could cause cumulative shadow flicker effects.

5.8 Residential Amenity

Residential amenity relates to the human experience of one's home, derived from the general environment and atmosphere associated with the residence. The quality of residential amenity is influenced by a combination of factors, including site setting and local character, land-use activities in the area and the relative degree of peace and tranquillity experienced in the residence.

As noted previously, the current land-use for the Proposed Development site is predominantly commercial forestry with some areas of agricultural land. The closest property to the Proposed Development is a derelict property located approximately 63 metres from the closest turbine (T4). The closest third-party inhabitable property is located approximately 297 metres from the closest turbine (T5). The closest property owned and occupied by a participating landowner is located approximately 336 metres from the nearest turbine (T1).

When considering the amenity of residents in the context of a proposed wind farm, there are three main potential impacts of relevance: 1) Shadow Flicker, 2) Noise, and 3) Visual Amenity. Shadow flicker and noise are quantifiable aspects of residential amenity while visual amenity is more subjective.

Detailed shadow flicker and noise modelling have been completed as part of this EIAR (Section 5.7 above refers to shadow flicker modelling, Chapter 11 addresses noise). A comprehensive landscape and visual impact assessment have also been carried out, as presented in Chapter 13 of this EIAR. Impacts on human beings during the construction, operational and decommissioning phases of the Proposed Development is assessed in relation to each of these key issues and other environmental factors such as noise, traffic and dust; see Impacts in Section 5.9 below. The impact on residential amenity is then derived from an overall judgement of the combination of impacts due to shadow flicker, changes to land-use and visual amenity, noise, traffic, dust and general disturbance.

5.9 Likely Significant Impacts and Associated Mitigation Measures

5.9.1 'Do-Nothing' Scenario

If the Proposed Development were not to proceed, the current wind farm would be decommissioned. Additionally, the Proposed Development is an extension of duration to the current Dunneill Wind Farm and the opportunity to maximise the generating capacity of Ireland's wind sector at this location would be lost, as would the future opportunities to further contribute to meeting Government and EU targets for the production and consumption of electricity from renewable resources and the reduction of greenhouse gas emissions.

5.9.2 Construction Phase

As has been detailed in Chapter 1 and Chapter 4 of this EIAR, no new construction will occur for the Proposed Development, as the proposal seeks to extend the operational life of the existing wind farm and associated on-site infrastructure. Therefore, there is no potential for construction phase related impacts commonly discussed, such as may relate to Population and Human Health, including Health and Safety, Noise, Dust, and Traffic related impacts.

5.9.3 Operational Phase

The effects set out below relate to the operational phase of the Proposed Development.

5.9.3.1 Health and Safety

Pre-Mitigation Impact

It is not anticipated that the operation of the wind farm will present a danger to the public and livestock. Rigorous safety checks are conducted on the turbines during design, construction, commissioning, and operation to ensure the risks posed to staff, landowners and the general public are negligible.

The operational phase of the Proposed Development poses little threat to the health and safety of the public. The Department of the Environment, Heritage and Local Government (DoEHLG)'s '*Wind Energy Development Guidelines for Planning Authorities 2006*' state that there are no specific safety considerations in relation to the operation of wind turbines. Fencing or other restrictions are not necessary for safety considerations. People or animals can safely walk up to the base of the turbines.

The DoEHLG Guidelines state that there is a very remote possibility of injury to people from flying fragments of ice or from a damaged blade. However, most blades are composite structures with no bolts or separate components and the danger is therefore minimised. The build-up of ice on turbines is unlikely to present problems. The wind turbines will be fitted with anti-vibration sensors, which will detect any imbalance caused by icing of the blades. The sensors will cause the turbine to wait until the blades have been de-iced prior to beginning operation.

The turbine blades are typically manufactured of wood and laminated layers of glass fibre which will prevent any likelihood of an increase in lightning strikes within Proposed Development site or the local area. Lightning protection conduits will be integral to the construction of the turbines. Lightning conduction cables, encased in protection conduits, will follow the electrical cable run, from the nacelle to the base of the turbine. The conduction cables will be earthed adjacent to the turbine base. The earthing system will be installed during the construction of the turbine foundations. There will be no impact on health and safety.

It is not anticipated that the operation of the wind farm will present a danger to the public and livestock. Rigorous safety checks are conducted on the turbines during design, construction, commissioning, and operation to ensure the risks posed to staff, landowners and general public are negligible.

Proposed Mitigation Measures

Notwithstanding the above, the following mitigation measures will be implemented during the operation of the Proposed Development to ensure that ensure the risks posed to staff and landowners remain negligible throughout the operational life of the wind farm.

Access to the turbines is through a door at the base of the structure, which will be locked at all times outside maintenance visits.

Staff associated with the project will conduct frequent visits, which will include inspections to establish whether any signs have been defaced, removed or are becoming hidden by vegetation or foliage, with prompt action taken as necessary.

Signs will also be erected at suitable locations across the site as required for the ease and safety of operation of the wind farm. These signs include:

- Buried cable route markers at regular intervals and change of cable route direction;
- Directions to relevant turbines at junctions;
- “No access to Unauthorised Personnel” at appropriate locations;
- Speed limits signs at site entrance and junctions;
- “Warning these Premises are alarmed” at appropriate locations;
- “Danger HV” at appropriate locations;
- “Warning – Keep clear of structures during electrical storms, high winds or ice conditions” at site entrance;
- “No unauthorised vehicles beyond this point” at specific site entrances; and
- Other operational signage required as per site-specific hazards.

An operational phase Health and Safety Plan has been developed to fully address identified Health and Safety issues associated with the operation of the site and providing for access for emergency services at all times. This Health and Safety Plan will be updated regularly as necessary.

The components of a wind turbine are designed to last up to 30 years and are equipped with a number of safety devices to ensure safe operation during their lifetime. During the operation of the wind farm regular maintenance of the turbines will be carried out by the turbine manufacturer or appointed service company. A project or task specific Health and Safety Plan will be developed for these works in accordance with the site’s health and safety requirements.

Residual Impact

With the implementation of the above mitigation measures, there will be a long-term, imperceptible residual impact on health and safety during the operational life of the Proposed Development.

Significance of Effects

Based on the assessment above there will be no significant direct or indirect effects.

5.9.3.2 Employment and Investment

The operational phase will present an opportunity for mechanical-electrical contractors and craftspeople to become involved with the maintenance and operation of the wind farm. On a long-term scale, the Proposed Development will create approximately 2 jobs during the operational phase relating to the maintenance and control of the wind farm, having a long-term slight positive effect.

5.9.3.3 Tourism

Pre-Mitigation Impacts

Given that there are currently no tourism attractions or amenity walkways located within the site there are no impacts associated with the operational phase of the development. The Department of the Environment, Heritage and Local Government's *Wind Energy Development Guidelines for Planning Authorities* 2006 state that "*the results of survey work indicate that tourism and wind energy can co-exist happily*". It is not considered that the Proposed Development would have an adverse impact on tourism infrastructure in the vicinity. Renewable energy developments are an existing feature in the surrounding landscape, which will assist in the assimilation of the Proposed Development into this environment.

5.9.3.4 Shadow Flicker

Pre-Mitigation Impacts

Assuming worst-case conditions, a total of 9 no. properties may experience daily shadow flicker in excess of the DoEHLG guideline threshold of 30 minutes per day. Of these 9 no. properties, 5 no. properties are in a derelict condition, 1 no. property is occupied by a participating landowner and 3 no. properties are third-party inhabitable dwellings which would require mitigation. The DoEHLG total annual guideline limit of 30 hours is not exceeded at any property within the 520m study area. There will be no perceived shadow flicker impacts on derelict properties and therefore, they are not subject to mitigation strategies.

Proposed Mitigation Measures

Where daily or annual shadow flicker exceedances are predicted to be experienced at nearby dwellings, the following measures will be employed.

Screening Measures

In the event of an occurrence of shadow flicker exceeding guideline threshold values of 30 minutes per day at residential receptor locations, mitigation options will be discussed with the affected homeowner, including:

- Installation of appropriate window blinds in the affected rooms of the residence;

- Planting of screening vegetation;
- Other site-specific measures which might be agreeable to the affected party and may lead to the desired mitigation.

If agreement can be reached with the property owner, then it would be arranged for the required mitigation to be implemented in cooperation with the affected party as soon as practically possible and for the full costs to be borne by the wind farm operator.

Wind Turbine Control Measures

If it is not possible to mitigate any identified shadow flicker limit exceedance locally using the measures detailed above, wind turbine control measures will be implemented.

Wind turbines can be fitted with shadow flicker control units to allow the turbines to be controlled to prevent the occurrence of an exceedance of shadow flicker limits at properties surrounding the wind turbines. The shadow flicker control units will be added to any required turbines.

A shadow flicker control unit allows a wind turbine to be programmed and controlled using the wind farm's SCADA control system to change a particular turbine's operating mode during certain conditions or times, or even turn the turbine off if necessary.

All predicted incidents of shadow flicker can be pre-programmed into the wind farm's control software. The wind farm's SCADA control system can be programmed to shut down any particular turbine at any particular time on any given day to ensure that shadow flickers occurrences at properties which are not naturally screened or cannot be screened with measures outlined above. Where such wind turbine control measures are to be utilised, they need only be implemented when the specific combined circumstances occur that are necessary to give rise to the shadow flicker effect in the first instance. Therefore, if the sun is not shining on a particular day that shadow flicker was predicted to occur at a nearby property, there would be no need to shut down the relevant turbines that would have given rise to the shadow flicker at the property. Similarly, if the wind speed were below the cut-in speed that caused the turbine rotor to rotate and give rise to a shadow flicker effect at a nearby property, there would be no need to shut down the relevant turbines that otherwise would have caused an exceedance of the shadow flicker limits.

The atmospheric variables that determine whether shadow flicker will occur or not, are continuously monitored at the wind farm site and the data fed into the wind farm's SCADA control system. The strength of direct sunlight is measured by way of photocells, and if the sunlight is of sufficient strength to cast a shadow, the shadow flicker control mechanisms come into effect. Wind speed and direction are measured by anemometers and wind vanes on each turbine and on the wind farm's met mast, and similarly, and if wind speed and direction is such that a shadow will be cast, the shadow flicker control mechanisms come into effect to prevent any potential exceedance of the guideline limits. The moving blades of the turbine will require a short period of time to cease rotating and as such there may be a very short period during which the blades are slowed to a complete halt.

In order to ensure that the model is accurate, the SCADA system will be reviewed to make sure it is shutting down turbines during the required time periods. The shadow flicker prediction data will be used to select dates on which a shadow flicker event could be observed at one or multiple affected properties and the following process will be adhered to.

1. *Recording the weather conditions at the time of the site visit, including wind speeds and direction (i.e. blue sky, intermittent clouds, overcast, moderate breeze, light breeze, still etc.).*
2. *Recording the house number, time and duration of site visit and the observation point GPS coordinates.*
3. *Recording the nature of the sensitive receptor, its orientation, windows, landscaping in the vicinity, any elements of the built environment in the vicinity, vegetation.*

4. *In the event of shadow flicker being noted as occurring the details of the duration (times) of the occurrence will be recorded*
5. *The data will then be sent to the wind farm operational team to confirm that the model and SCADA system are working.*
6. *Following 12 months of full operation of the Proposed Development a report can be prepared for the Local Authority describing the shadow flicker mitigation measures used at the wind farm and confirming the implementation and successful operation of the system.*

This method of shadow flicker mitigation has been technically well-proven at wind farms in Ireland and also in areas outside Ireland that experience significantly longer periods of direct sunlight.

In order to demonstrate how the SCADA control system can be applied to switch off particular turbines at the relevant times and dates. Table 5-14 lists the 3 no. properties at which a shadow flicker mitigation strategy may be necessary to ensure the DoEHLG 30-minute per day shadow flicker threshold is not exceeded. In this case, the relevant turbine(s) would be programmed to switch off for the time required to reduce daily shadow flicker to a maximum of 28 minutes, which is below the guideline limit of 30 minutes. The SCADA control system would be utilised to control shadow flicker in the absence of being able to agree suitable screening measures with the relevant property owner. The mitigation strategy outlined in Table 5-14 below is based on the worst-case scenario. The details presented in Table 5-14 list the days per year and the turbines that could be programmed to switch off at specific times, in order to reduce daily shadow flicker to a maximum of 28 minutes, which is below the guideline limit of 30 minutes.

Table 5-10 Shadow Flicker Mitigation Strategy – Turbine Numbers and Dates

Property No.	No. of Days 30min/day Threshold is Exceeded	Turbine(s) Producing Shadow Flicker	Days of Year When Mitigation May be Required (Day No's)*	Post-mitigation Maximum Daily Shadow Flicker (hrs:mins:sec)
3	167	T2, T4, T5	16th January – 12th February 16th March – 3rd of April 16th May – 26th July 8th September – 26th September 29th October – 26th November	00:28:00
6	22	T5	3rd April – 13th April 29th August – 8th September	00:28:00
7	10	Combination of T9 and T10	17th December - 26th December	00:28:00

**Note: days of year are based on the model undertaken in 2021*

Where a shadow flicker mitigation strategy is to be implemented, it is likely that the control mechanisms would only have to be applied to one turbine to bring the duration of shadow flicker down to the 28-minute post-mitigation shadow flicker target.

Overall, the details presented in Table 5-14 demonstrate that using the turbine control system, it will be possible to reduce the level of shadow flicker at any affected property to below the daily guideline limit of 30 minutes, by programming the relevant turbines to switch off at the required dates and times.

This measure can be utilised at the Proposed Development site to prevent incidences of exceedance of the guideline shadow flicker limits at any house. While the shadow flicker mitigation measures will be implemented in line with the current WEDGs (2006), it should also be noted the Proposed Development and associated mitigation measures can be brought in line with the requirements of the 2019 Draft Guidelines, should the draft guidelines be adopted as currently proposed.

Notwithstanding the approach set out above should shadow flicker associated with the permitted development be perceived to cause a nuisance at any home, the affected homeowner is invited to engage with the Developer. Should a complaint be received during the extension of operation of the Proposed Development the homeowner will be asked to log the date, time and duration of shadow flicker events occurring on at least five different days. The provided log will be compared with the predicted occurrence of shadow flicker at the residence.

Residual Impact

Following the implementation of the above suite of mitigations measures, the current DoEHLG guideline limit of 30 mins per day or 30 hours per year will not be exceeded and this will result in a long-term, imperceptible negative residual impact from shadow flicker on human health.

Significance of Effects

Based on the assessment above and the mitigation measures proposed there will be no significant effects related to shadow flicker.

5.9.3.4.2 *Cumulative Shadow Flicker Mitigation Measures*

It has been demonstrated in Section 5.7.5.2 that there are no properties that will experience cumulative shadow flicker impacts.

5.9.3.5 Interference with Communication Systems

Wind turbines, like all large structures, have the potential to interfere with broadcast signals, by acting as a physical barrier or causing a degree of scattering to microwave links. The alternating current, electrical generating and transformer equipment associated with wind turbines, like all electrical equipment, also generates its own electromagnetic fields, and this can interfere with broadcast communications. The most significant effect at a domestic level relates to a possible flicker effect caused by the moving rotor, affecting, for example, radio signals. The most significant potential effect occurs where the wind farm is directly in line with the transmitter radio path. This interference can be overcome by the installation of deflectors or repeaters.

As this wind farm is already operational, the usual scoping and consultation process involving organisations such as regional broadcasters, and fixed and mobile phone operators was not necessary as the existing wind farm is not known to cause any disruption to any broadcasting services. Full details are provided in Chapter 2: Background to the Proposed Development and Section 14.3 (Telecommunications and Aviation) of Chapter 14: Material Assets. The Proposed Development will have no impact on telecommunications.

5.9.3.6 Residential Amenity

Pre-Mitigation Impacts

Potential impacts on residential amenity during the operational phase of the Proposed Development could arise primarily due to noise, shadow flicker or changes to visual amenity. Detailed noise and shadow flicker modelling have been carried out as part of this EIAR, which shows that the Proposed

Development will be capable of meeting all required guidelines in relation to noise thresholds and the shadow flicker thresholds set out in the Wind Energy Guidelines (DoEHLG 2006).

The visual impact of the Proposed Development is addressed comprehensively in Chapter 13: Landscape and Visual.

There is only one third-party property located within 4 times the turbine tip height (300m), a recognised parameter in assisting in the protection of residential visual amenity. The closest third-party property (inhabitable dwelling) to the Proposed Development is located approximately 297m from the closest turbine (T5). All mitigation as outlined under noise and vibration, visual amenity and shadow flicker in this EIAR will be implemented in order to reduce insofar as possible impacts on residential amenity at properties located in the vicinity of the Proposed Development.

Residual Impact

With the implementation of the mitigation measures outlined in relation to noise and vibration, shadow flicker and visual amenity, the Proposed Development will have an imperceptible impact on residential amenity.

Significance of Effects

Based on the assessment above there will be no significant direct or indirect effects on residential amenity.

5.9.4 Decommissioning Phase

The Proposed Development includes for the extension of duration of an existing wind farm for a further 15 years. Following the end of their useful life, the wind turbines may be replaced with a new set of turbines, subject to planning permission being obtained, or the site may be decommissioned completely. The substation and all associated above-ground site infrastructure will be removed and the site returned to its former uses as commercial forestry and agricultural land.

The works likely required during the decommissioning phase are described in Section 4.8 of Chapter 4 of this EIAR. Any impacts and consequential effects that occur during the decommissioning phase will be similar to that which typically occur during the construction phase, however, to a lesser extent.

5.9.5 Cumulative Effects

For the assessment of cumulative impacts, any other existing, permitted or Proposed Developments (wind energy or otherwise) have been considered. The factors to be considered in relation to cumulative effects include population and human health, biodiversity, land, soil, water, air, climate, material assets, landscape, and cultural heritage as well as the interactions between these factors.

The potential cumulative impact of the Proposed Development and other relevant developments has been carried out with the purpose of identifying what influence the Proposed Development will have on the surrounding environment when considered cumulatively and in combination with relevant approved, and existing projects in the vicinity of the proposed site.

Further information on projects considered as part of the cumulative assessment are given in Chapter 2: Background to the Proposed Development. The impacts with the potential to have cumulative effects on human beings are discussed below and in more detail in the relevant chapters: noise (Chapter 11), visual impacts (Chapter 12) and traffic (Chapter 14).

As noted previously, the Proposed Development is seeking permission for an extension of duration of an existing operational wind farm for an additional 15 years.

5.9.5.1 Employment and Economic Activity

Wind farms within 20 kilometres of the Proposed Development which may be proposed, permitted or operational/existing contribute to short term employment during the construction stages and provide the potential for long-term employment resulting from maintenance operations. This results in a long-term significant positive impact.

The commercial forestry activities on the site of the Proposed Development provides between 3-6 months of employment, either for harvesting or replanting per year. These activities can continue while the proposed wind farm is under construction and operating, resulting in a long-term moderate positive cumulative impact.

5.9.5.2 Tourism and Amenity

There are no key identified tourist attractions pertaining specifically to the site of the Proposed Development itself.

It is not considered that the Proposed Development together with other projects in the area will cumulatively affect any tourism infrastructure in the wider area. As mentioned previously, wind farms are an existing feature in the surrounding landscape, which will assist in the assimilation of the Proposed Development into this environment. As also noted in Section 5.3 above, the conclusions from available research indicate there is a generally positive disposition among tourists towards wind development in Ireland. It is on this basis that it can be concluded that there would be a long-term imperceptible cumulative impact from the Proposed Development and other wind farm developments in the area.

5.9.5.3 Air (Dust)

The nature of the Proposed Development is such that, as operational, it will have a long-term, moderate, positive impact on the air quality.

As previously noted, the application for this Proposed Development seeks permission for an extension of duration to the operational life of the wind farm, so no concerns that are usually associated with the construction phase pertaining to dust are relevant here.

The nature of the Proposed Development and other wind energy developments within 20 kilometres are such that, once operational, they will have a cumulative long-term, significant, positive effect on the air quality and climate.

5.9.5.4 Noise

As outlined previously, concerns associated with the construction phase of a wind farm do not apply in this case. Therefore, there are not likely to be any cumulative noise issues associated with this wind farm.

The potential for noise impacts during the operational phase of the Proposed Development is assessed fully in Chapter 11: Noise.

5.9.5.5 Health and Safety

The Proposed Development will have no impacts in terms of health and safety. There is no credible scientific evidence to link wind turbines with adverse health impacts. All other proposed, permitted or operational/existing developments (wind energy or otherwise) would be expected to follow all relevant Health and Safety Legislation during the operation and decommissioning phases of the development. It is assumed also that all mitigation measures in relation to the other cumulative projects will also be implemented. It is on this basis that it can be concluded that there would be a long-term imperceptible cumulative impact from the Proposed Development and other developments in the area.

5.9.5.6 Property Values

As noted in Section 5.6 above, the conclusions from available international literature indicate that property values are not impacted by the positioning of wind farms near houses. It is on this basis that it can be concluded that there would be a long-term imperceptible cumulative impact from the Proposed Development and other wind farm developments in the area.

5.9.5.7 Services

The rate payments from the Proposed Development and other projects in the area will contribute significant funds to Sligo County Council, which will be redirected to the provision of public services within the County. In addition, the injection of money into local services though the establishment of community benefit funds is also expected to be a long-term positive cumulative impact.

5.9.5.8 Shadow Flicker

As outlined in Section 5.7.5.2, the nearest wind farm development to the Proposed Development is the existing Kingsmountain Wind Farm located approximately 2.1km southeast of Dunneill. At this distance cumulative shadow flicker impacts are not anticipated. There are no dwellings which will be impacted by cumulative shadow flicker from the Proposed Development in combination with the Existing Kingsmountain Wind Farm. Once the mitigation measures outlined in Section 5.9.3.4 have been implemented for the Proposed Development there will be no significant impacts from the Proposed Development with regard to shadow flicker.

5.9.5.9 Residential Amenity

Pre-Mitigation Impacts

As there is no construction phase associated with this Proposed Development, it is extremely unlikely that any cumulative impacts associated with vibration, dust or traffic will be associated with this development. The potential for cumulative noise impacts are considered in Chapter 11: Noise and Vibration.

Proposed Mitigation Measures

All mitigation as outlined in this EIAR will be implemented in order to reduce insofar as possible impacts on residential amenity at properties located in the vicinity of the Proposed Development. It is assumed also that all mitigation measures in relation to the other cumulative projects will also be implemented. A cumulative list of other wind farms is presented in Chapter 2 of this EIAR. Kingsmountain Wind Farm is the closest existing or permitted wind farm to the Proposed Development, located approximately 2km east-southeast of Dunneill. At these distances no impacts on residential amenity are anticipated.

Residual Impact

During the operational phase, noise and shadow flicker from the proposed and permitted projects will be limited to below guideline levels or as committed to by the developer, resulting in a long-term, imperceptible residual impact from on residential amenity.

Significance of Effects

Based on the assessment above there will be no significant direct or indirect effects.

5.10 Summary

Following consideration of the residual impacts (post-mitigation) it is noted that the Proposed Development will not result in any significant effects on Human Beings in the area surrounding the Proposed Development. Following appropriate mitigation, the DoEHLG Wind Energy Guideline shadow flicker limits will not be exceeded at any property.

Provided that the Proposed Development is operated in accordance with the design, best practice and mitigation that is described within this application, significant effects on population and human health, associated with health and safety, noise, dust, traffic and shadow flicker, are not anticipated at international, national or county scale.

6. BIODIVERSITY

6.1 Introduction

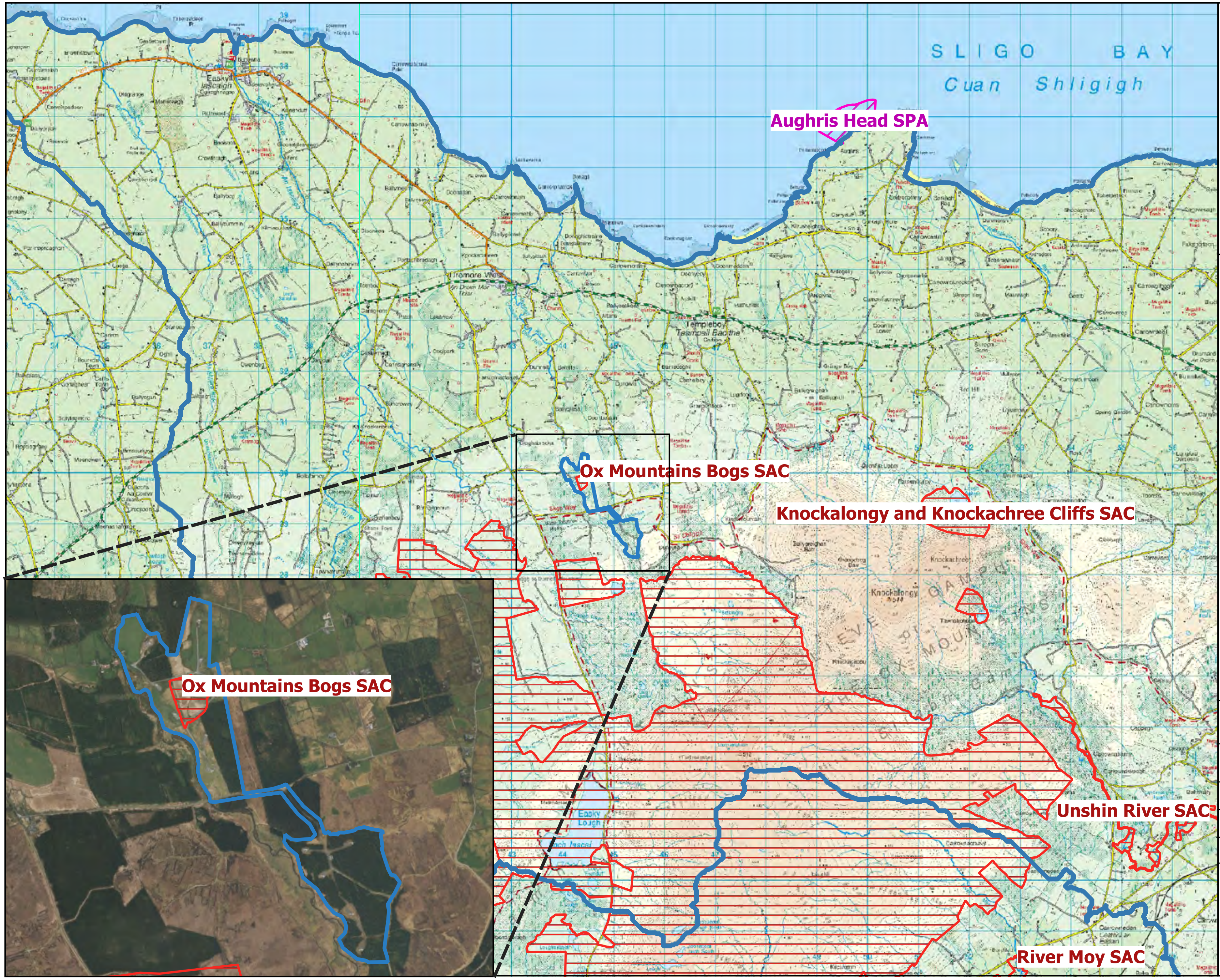
This Chapter of the Environmental Impact Assessment Report (EIAR) assesses the likely significant effects (both alone and cumulatively with other projects) that the proposed extension of the operational life of the existing Dunneill Wind Farm may have on Biodiversity, Flora and Fauna and prescribes mitigation measures that will be implemented to mitigate any likely effects that are identified. The residual impacts on biodiversity are then assessed. Particular attention has been paid to species and habitats of ecological importance. These include species and habitats with national and international protection under the Wildlife Acts 1976-2019, EU Habitats Directive 92/43/EEC. The full description of the proposed development is provided in Chapter 4 of this EIAR. Impacts on avian receptors are considered in Chapter Seven of this EIAR.

The chapter is structured as follows:

- The Introduction provides a description of the legislation, guidance and policy context applicable to Biodiversity, Flora and Fauna.
- This is followed by a comprehensive description of the ecological survey and impact assessment methodologies that were followed to inform the robust assessment of likely significant effects on ecological receptors.
- A description of the Baseline Ecological Conditions and Receptor Evaluation is then provided.
- This is followed by an Assessment of Effects which are described with regard to each phase of the Proposed Development: operational phase and decommissioning phase. Potential Cumulative effects in combination with other projects are fully assessed. There are no construction works associated with the proposed development (which consists of the extension of the operational life of the existing windfarm only) and therefore no potential for construction stage effects.
- Proposed mitigation and best practice measures to avoid, reduce or offset any identified effects are described and discussed. This is followed by an assessment of residual effects taking into consideration of 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 proposed extension of the operational life and future decommissioning of the existing Dunneill Wind Farm is referred to as the 'Proposed Development'.
- For the purpose of this EIAR, the term 'Site Boundary' or 'site' refers to the site green line boundary, comprising the entire area shown in Figure 6-1. This includes the existing Dunneill windfarm infrastructure as well as the surrounding lands. The layout of the site is illustrated in Figure 6-2.
- "Key Ecological Receptor" (KER) is defined as a species or habitat occurring within the zone of influence of the development upon which likely significant effects are anticipated.
- "Zones of Influence" (ZOI) for individual ecological receptors refers to the zone within which potential effects are anticipated. ZOIs differ depending on the sensitivities of particular habitats and species and were assigned in accordance with best available guidance and through adoption of a precautionary approach.



Map Legend

- EIAR Site Boundary
- WFD Catchments
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)

Drawing Title

Site Location

Project Title

Dunneill Wind Farm Extension of Operation

Drawn By	Checked By
KOD	SM
Project No. 210207	Drawing No. Figure 6.1
Scale 1:97,000	Date 2022-07-07

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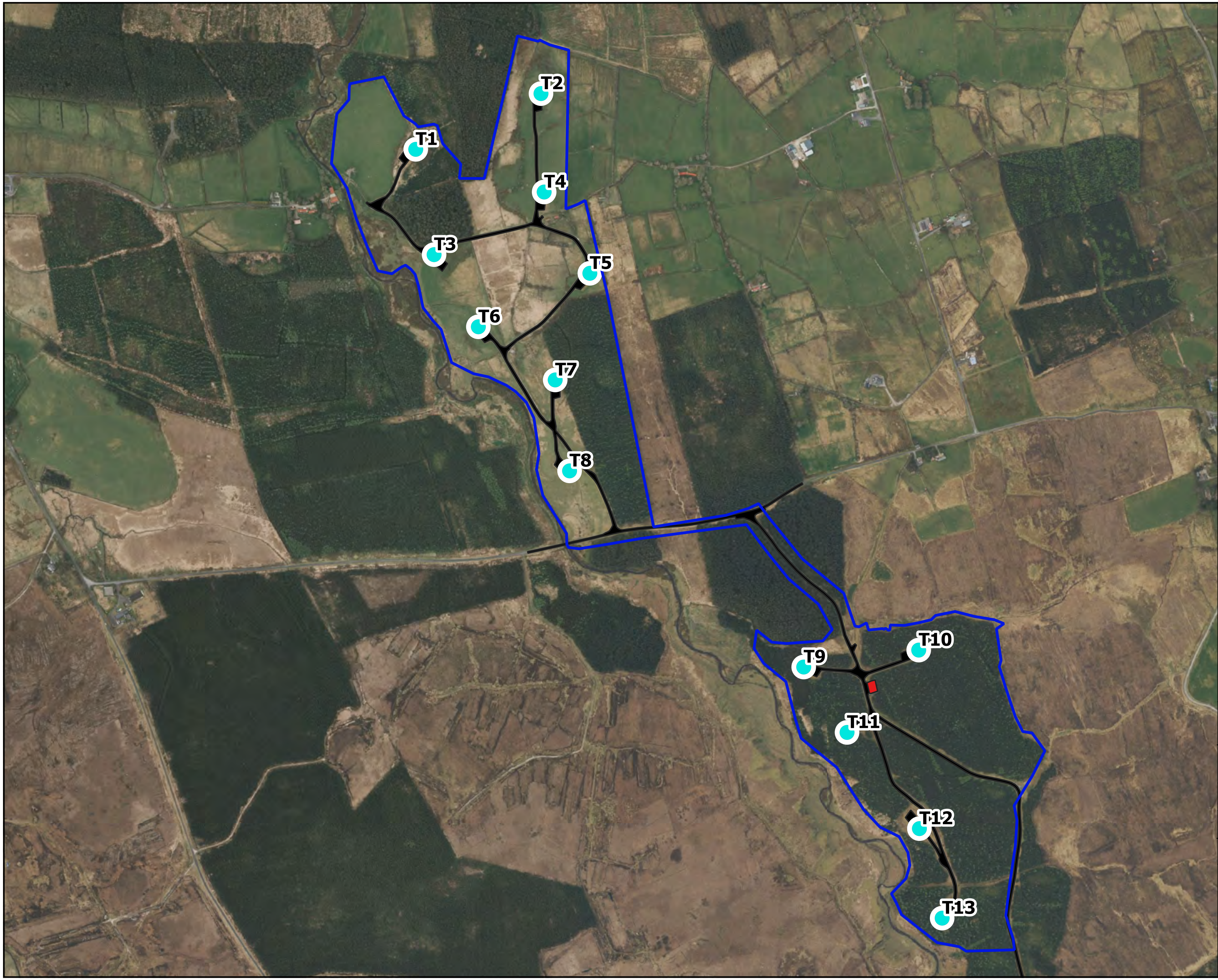

Drawing Title: Current Infrastruture Layout	
Project Title: Dunneill Wind Farm Extension of Operation	
Drawn By: KOD	Checked By: SM
Project No.: 210207	Drawing No.: Figure 6-2
Scale: 1:11,000	Date: 2022-07-07

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6.2 Requirements for Ecological Impact Assessment

National Legislation

The Wildlife Act, 1976–2021 is the principal piece of legislation governing protection of wildlife in Ireland. The Wildlife Act provides strict protection for species of conservation value. The Wildlife Act conserves wildlife (including game) and protects certain wild creatures and flora. These species are therefore considered in this report as ecological receptors. Natural Heritage Areas (NHAs) and Proposed Natural Heritage Areas (pNHAs) are heritage sites that are designated for the protection of flora, fauna, habitats and geological sites. Only NHAs are designated under the Wildlife (Amendment) Act 2017. 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 designated[1] However, these sites are considered to be of significance for wildlife and habitats as they may form statutory designated sites in the future (NPWS, 2020).

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

National Policy

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

- "Incorporate into legislation the requirement for consideration of impacts on biodiversity to ensure that conservation and sustainable use of biodiversity are taken into account in all relevant plans and programmes and relevant new legislation;
- Public and Private Sector relevant policies will use best practice in SEA, AA and other assessment tools to ensure proper consideration of biodiversity in policies and plans;
- All Public Authorities and private sector bodies move towards no net loss of biodiversity through strategies, planning, mitigation measures, appropriate offsetting and/or investment in Blue-Green infrastructure;
- Strengthen ecological expertise in local authorities and relevant Government Departments and agencies;
- Local Authorities will review and update their Biodiversity and Heritage Action Plans;
- Local Authorities will review and update their Development Plans and policies to include policies and objectives for the protection and restoration of biodiversity;
- Develop a Green Infrastructure at local, regional and national levels and promote the use of nature based solutions for the delivery of a coherent and integrated network;

[1] https://www.npws.ie/protected-sites/nha (accessed 09 August 2022).

- Continue to produce guidance on the protection of biodiversity in designated areas, marine and the wider countryside for Local Authorities and relevant sectors;
- Integrate Natura 2000 and Biodiversity financial expenditure tracking into Government Programmes internal paying agency management
- procedures including linkage to the Prioritised Action Framework and this NBAP;
- Develop a Natural Capital Asset Register and national natural capital accounts by 2020, and integrate these accounts into economic policy and decision-making;
- Initiate natural capital accounting through sectoral and small scale pilot studies, including the integration of environmental and economic statistics using the framework of the UN System of Experimental-Ecosystem Accounting (SEEA);
- Establish a national Business and Biodiversity Platform under the CBD's Global Business Partnership;
- Ensure Origin Green produces tangible benefits for biodiversity with increased emphasis on conservation and restoration of biodiversity;
- 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 site 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 2000-2021 (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. SACs, cSACs, SPAs or cSPAs) has been carried out in the 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.

6.3 Scoping/Review of Relevant Guidance and Sources of Consultation

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

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

- Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater and Coastal (CIEEM, 2018).

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).
- Planning and Development Acts 2000 (as amended).

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:

- Sligo County Development Plan 2017-2023

6.3.1 Statement of Authority

This report has been prepared by Kate O Donnell (B.Sc.). Kate is an Ecologist at MKO and holds a B.Sc. (Hons) in Ecology and Environmental Biology. Kate has over 3 years' experience working in ecological consultancy. This report has been reviewed by Sarah Mullen (B.Sc., M.Sc., Ph.D., ACIEEM). Sarah holds a B.Sc. (Hons) in Botany, an M.Sc. in Biodiversity and Conservation and a Ph.D. in Botany,. Sarah has over 6 years' experience working in ecological consultancy and has extensive experience in undertaking habitat and species surveys and working on Ecological Impact Assessment and Appropriate Assessment.

The baseline ecological surveys were undertaken in October 2021 and April 2022 by Olivia O'Gorman (B.Sc., M.Sc.), Claire Stephens (B.Sc.) and Kate O'Donnell (B.Sc.) of MKO. Claire is an Ecologist at MKO with a B.Sc. (Hons) in Environmental Science and over 4 years' experience in ecological surveying. Olivia has a B.Sc. (Hons) in Zoology, a M.Sc. in Ecological Assessment and over 5 years' experience in conservation and environmental consultancy.

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

6.4 Methodology

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

6.4.1 Desk Study

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

- Review of NPWS Article 17 maps 2019, 2013 and 2007.
- Review of online web-mappers: National Parks and Wildlife Service (NPWS), EPA (Envision), Water Framework Directive (WFD) and Inland Fisheries Ireland (IFI).
- Inland Fisheries Ireland (IFI) Reports, where available.
- Data on potential occurrence of protected bryophytes – as per NPWS online map viewer; Flora Protection Order Map Viewer – Bryophytes[2].
- Review of relevant Plans, including the National Biodiversity Action Plan 2017-2021, County Biodiversity Plan and the All Ireland Pollinator Plan 2015-2020.
- Review of the Bat Conservation Ireland (BCI) Private Database.
- Review of the publicly available National Biodiversity Data Centre (NBDC) web-mapper.

[2] NPWS, 2022, Online map viewer; Flora Protection Order Map Viewer – Bryophytes. Online, Available at: http://dahg.maps.arcgis.com/apps/webappviewer/index.html?id=71f8df33693f48edbb70369d7fb26b7e, Accessed: 12/04/2022.

- Records from the NPWS web-mapper and review of specially requested records from the NPWS Rare and Protected Species Database for the hectads in which the Proposed Development is located.
- Potential for in-combination effects have been considered in Chapter 2 of this EIAR and Section 6.8 of this Chapter. This was informed by a review of the EIARs prepared for other plans and projects occurring in the wider area.

6.4.2 Scoping and Consultation

MKO undertook a scoping exercise during preparation of this EIAR, as described in Chapter 2, Section 2.6 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 2-3 in Chapter 2 of this EIAR describes where the comments raised in the scoping responses received have been addressed in this assessment. Table 6-1 provides a list of the organisations consulted with regard to biodiversity during the scoping process, and notes where scoping responses were received.

Table 6-1 Organisations consulted with regard to biodiversity

Consultee	Date Response Received	Response	Addressed in Section
Department of Agriculture, Food and the Marine (DAFM)	29.06.2021	If the Proposed Development will involve the felling or removal of any trees, the DAFM states that the developer must obtain a Felling License from this Department before trees are felled or removed. The response further notes that the interaction of proposed works with the environment locally and more widely, in addition to potential direct and indirect impacts on designated sites and water, will need to be assessed. Consultation with relevant environmental and planning authorities may be required where specific sensitivities arise (e.g. local authorities, National Parks & Wildlife Service, Inland Fisheries Ireland, and the National Monuments Service.	There will be no felling as part of the proposed development. Potential for direct and indirect impacts designated sites and water have been addressed in **Section 6.7.3.**
An Taisce	-	No response received to date	-
Bat Conservation Ireland	-	No response received to date	-
Birdwatch Ireland	-	No response received to date	-
Butterfly Conservation Ireland	-	No response received to date	-
Department of Communications, Climate Action	-	No response received to date	-

Consultee	Date Response Received	Response	Addressed in Section
and the Environment			
Department of Housing, Local Government and Heritage	-	No response received to date	-
Environmental Protection Agency	-	No response received to date	-
Inland Fisheries Ireland	29.06.2021	"The EIS should assess the potential impacts the Dunneill wind farm extension of operation may have on the aquatic and associated riparian habitat including the pollution of water, spread of nonnative species and interference with upstream and downstream movement of aquatic life. The assessment should include an assessment of the existing infrastructure and drainage network. Please find below IFI recommendations in relation to the proposed windfarm extension of operation EIA: - The watercourse culvert structures within the site should be assessed to ensure there is no physical or hydrological barrier to the upstream or downstream passage of fish. - All watercourses that are receiving drainage from the site should be assessed in terms of aquatic biodiversity with particular emphasis on fish, the food of fish, spawning grounds and fish habitat in general. Where invertebrate sampling was carried out previously as part of this development additional invertebrate sampling could be carried out to assess any change in populations. - The on-site drainage system and surface water hydrology should be assessed to ensure there is no pollution, sedimentation, or erosion due to the existing drainage infrastructure. Maintenance or mitigation measure may be required. - A survey for the presence of invasive species should be carried out and a management plan put in place where found.	This assessment has taken the comments received from IFI into consideration. Aquatic invertebrate sampling was undertaken along watercourses within and downstream of the site. Details of these assessments are provided in **Section 6.6.1.5.5.** 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 **Table 6.17**. During field surveys, a search for Invasive Alien Species (IAS) listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015) was conducted. No invasive species were found in proximity to any turbine sites. This is discussed in **Section 6.6.1.3** No new culverts or alterations to existing culverts are proposed as part of the proposed development therefore there will be no additional barriers to the upstream or downstream passage of fish.

Consultee	Date Response Received	Response	Addressed in Section
		IFI request that the following be addressed: Water quality; Surface water hydrology; Fish spawning and nursery areas; Passage of migratory fish; Areas of natural heritage importance; Biological diversity, ecosystem structure and functioning; Sport and commercial fishing; Sediment transport."	
Irish Peatland Conservation Council	-	No response received to date	-
Irish Red Grouse Association	-	No response received to date	-
Irish Raptor Study Group	-	No response received to date	-
Irish Wildlife Trust	18.06.2021	Irish Wildlife Trust responded on the 18th of June, stating that they do not have the capacity to respond to all scoping requests at the moment, but will respond if possible in the coming weeks.	-

6.4.3 Field Surveys

A comprehensive survey of the biodiversity of the entire site was undertaken on various dates throughout 2021 and 2022. The following sections fully describe the ecological surveys that have been undertaken and provide details of the methodologies, dates of survey and guidance followed.

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

Multidisciplinary walkover surveys were undertaken on the 14th September 2021 and the 26th April 2022. The survey timings fell within the recognised optimum period for vegetation surveys/habitat mapping, i.e. April to September (Smith *et al.*, 2011). A comprehensive walkover survey of the site was completed with a particular focus on the existing wind farm infrastructure footprint and adjacent habitats.

The walkover surveys were 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.

The multi-disciplinary walkover surveys comprehensively covered the existing windfarm infrastructure footprint and adjacent habitats. Habitats were identified in accordance with the Heritage Council's 'Guide to Habitats in Ireland' (Fossitt, 2000). Habitat mapping was undertaken with regard to guidance set out in 'Best Practice Guidance for Habitat Survey and Mapping' (Smith *et al.*, 2011). 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).

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.

6.4.3.2 Terrestrial Fauna Surveys

The results of the desk study, scoping replies, incidental records of protected species during ecological survey work and multidisciplinary walkover surveys were used to inform the scope of targeted ecological surveys required. Dedicated surveys for bats, otter and badger were undertaken at the times set out below with the methodologies followed also provided below.

During the multidisciplinary walkover surveys, records of invertebrates including butterflies, damselflies, dragonflies, moths, beetles etc. were also recorded.

6.4.3.2.1 *Bat Surveys*

A full detailed description of survey methodologies undertaken at the site during September 2021 and April 2022 are provided in Appendix 6.1 along with details of the survey times and the surveyors who carried out the bat survey and assessment work.

Survey design and effort in 2021 was created in accordance with the best practice guidelines available at the time, '*Bat Surveys: Good Practice Guidelines'* prepared by the Bat Conservation Trust (Hundt, 2012). Surveys undertaken in 2021 were undertaken in strict accordance with those prescribed in NatureScot (2021), (Previously SNH, 2019) '*Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation*'. This is in line with standard best practice industry guidelines.

The mitigation outlined in this report has been designed in accordance with NatureScot, 2021. Consideration was also given to the Northern Ireland Environment Agency (NIEA) Natural Environment Division (NED) Guidance[3], which was produced in August 2021 (amended May 2022), following the completion of the bat surveys at the Proposed Development site.

6.4.3.2.2 *Non-volant Mammal Surveys*

During the multidisciplinary walkover surveys, a comprehensive search of the site for the presence of terrestrial mammal species was undertaken and the habitats on site were assessed for their potential to support protected mammal species.

The survey included a search for signs of badger (*Meles meles*) and otter (*Lutra lutra*). The badger survey involved a search for all potential badger signs as per NRA (2009)[4] standard best practice guidance (latrines, badger paths and setts) and following CIEEM best practice competencies for species surveys (CIEEM, 2013). Badger surveys can be undertaken at any time of year and are most effective between November and April when vegetation cover is reduced (NRA, 2008). No limitations were identified and a full and comprehensive survey was achieved.

The watercourses within the site were surveyed for otter 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

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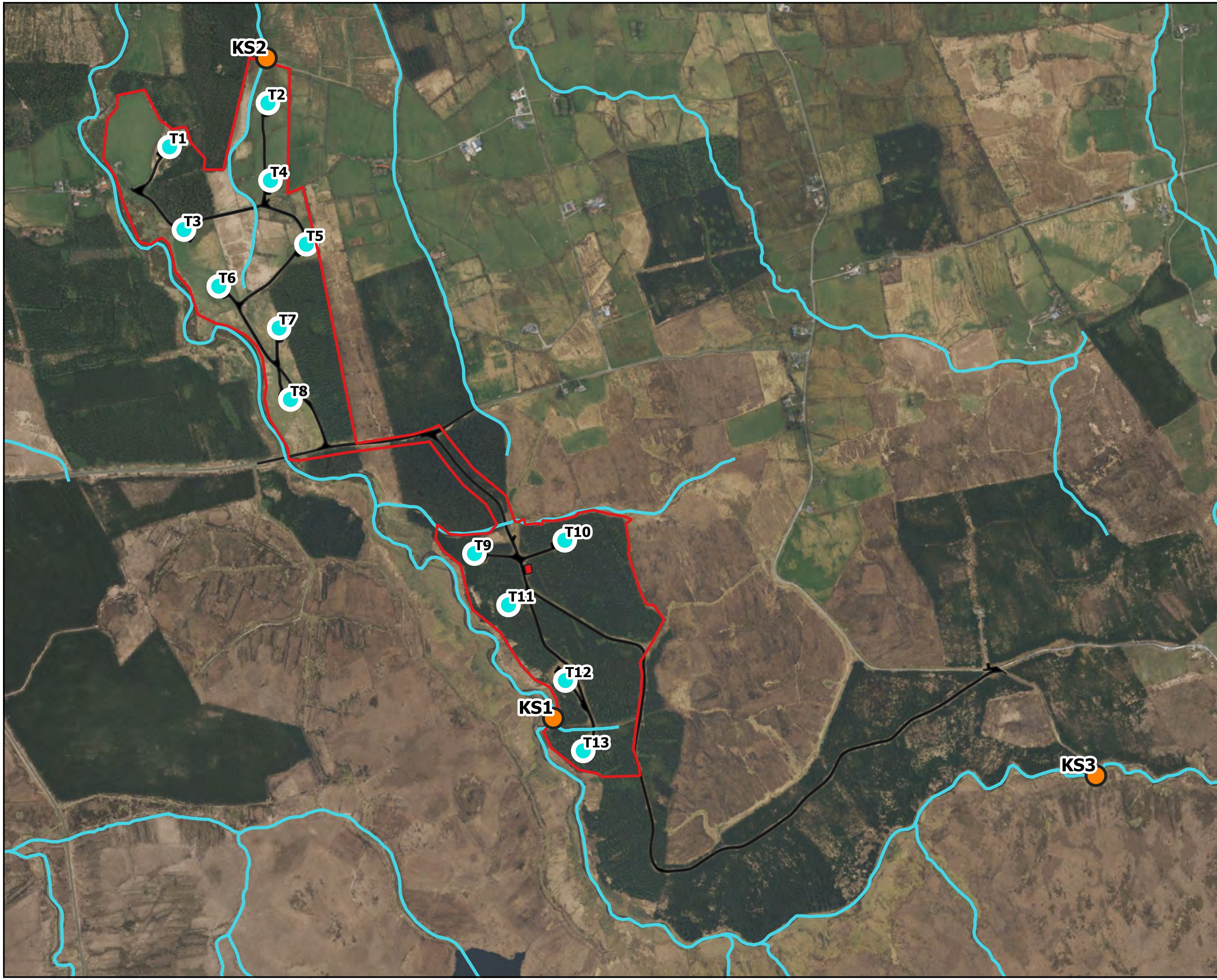
[3] Northern Ireland Environment Agency Natural Environment Division (NED) published Guidance on Bat Surveys, Assessment and Mitigation for Onshore Wind Turbine Developments in Northern Ireland (NIEA, 2021).
[4] TII/NRA (2009) guidelines (Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes).

addition to the width of the rivers/watercourses, a 10m riparian buffer was considered to comprise part of the otter habitat (NPWS 2009).

During the survey, a search for signs of other protected mammal species including red squirrel and pine marten was also undertaken.



Map Legend

- Existing Dunneill Turbines
- Existing Dunneill Substation
- Existing Dunneill Footprint
- EIAR Site Boundary
- Watercourses
- Kick Sample Locations

N

Drawing Title: Kick Sample Locations	
Project Title: Dunneill Wind Farm Extension of Operation	
Drawn By: KOD	Checked By: SM
Project No.: 210207	Drawing No.: Figure 6-3
Scale: 1:14,000	Date: 2022-07-07

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6.4.3.2.3 *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 April 2022. Representative locations along watercourses that drain the site were chosen for the assessment. The locations of each watercourse surveyed are provided in Figure 6-3.

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)[5]. 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 at 3 sites are provided in Section 6.6.1.5.5.

6.4.3.2.4 *Geyer's whorl snail*

Geyer's whorl snail is a QI of the Ox Mountains Bog SAC (NPWS, 2016)[6] and the known records for this species within the SAC are located in the small section of the SAC which lies within the proposed development site boundary. The habitats within this area comprising wet and dry heath and blanket bog habitats were assessed for their potential to support geyer's whorl snail during the multidisciplinary walkover survey. This area lies completely outside the existing windfarm infrastructure footprint.

6.4.3.2.5 *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).

6.4.3.2.6 *Survey limitations*

Seasonal factors that affect distribution patterns and habits of species were taken into account when conducting the surveys. The potential of the site to support certain populations (in particular those of conservation importance that may not have been recorded during the field survey due to their seasonal absence or nocturnal/cryptic habits) was assessed.

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.

6.4.4 Methodology for Assessment of Impacts and Effects

6.4.4.1 Identification of Target Receptors and Key Ecological Receptors

The methodology for assessment followed a precautionary screening approach with regard to the identification of Key Ecological Receptors (KERs). Following a comprehensive desk study "Target

[5] *Toner, P., Bowman, J., Clabby, K., Lucey, J., McGarrigle, M., Concannon, C.,. & MacGarthaigh, M. (2005). Water quality in Ireland. Environmental Protection Agency, Co. Wexford, Ireland.*
[6] *https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002006.pdf*

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.
- Special Conservation Interests (SCI) of Special Protection Areas (SPA) within the likely zone of impact.
- Species protected under the Wildlife Acts 1976-2019, updated in 2021.
- Species protected under the Flora Protection Order 2015.

6.4.4.2 Determining Importance of Ecological Receptors

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

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

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

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

6.4.4.3 Characterisation of Impacts and Effects

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

- **Positive or Negative.** Assessment of whether the Proposed Development results in a positive or negative effect on the ecological receptor.

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

6.4.4.4 Determining the Significance of Effects

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

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

When determining significance, consideration is given to whether:

- Any processes or key characteristics of key ecological receptors will be removed or changed
- There will be an effect on the nature, extent, structure and function of important ecological features
- There is an effect on the average population size and viability of ecologically important species.
- There is an effect on the conservation status of important ecological habitats and species.

The EPA Guidelines on information to be included in Environmental Impact Assessment Reports (EPA, 2022 and the *Guidelines for assessment of Ecological Impacts of National Road Schemes*, (NRA, 2009) were also considered when determining significance and the assessment is in accordance with those guidelines. The terminology used in the determination of significance follows the suggested language set out in the EPA Guidelines (2022) as shown in Table 6-2.

Table 6-2: Criteria for determining significance of effect, based on (EPA, 2022) guidelines

Effect Magnitude	Definition
No change	No discernible change in the ecology of the affected feature.
Imperceptible effect	An effect capable of measurement but without noticeable consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.

Effect Magnitude	Definition
Slight effect	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate effect	An effect that alters the character of the environment that is consistent with existing and emerging trends.
Significant effect	An effect which, by its character, its magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound effect	An effect which obliterates sensitive characteristics.

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

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

Integrity

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

Conservation status

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

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

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

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

The conservation of a species is favourable when:

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats
- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future

- There is and will probably continue to be, a sufficiently large habitat to maintain its population on a long-term basis.

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

6.4.4.5 Incorporation of Mitigation

Section 6.7 of this EIAR assesses the potential effects of the Proposed Development to ensure that all effects on sensitive ecological receptors are adequately addressed. Where significant effects on sensitive ecological receptors are predicted, mitigation 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.

6.5 Establishing the Ecological Baseline

6.5.1 Desk Study

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

6.5.1.1 Designated Sites

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

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

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 Natura Impact Statement that accompanies this application. As per EPA Guidance 2022, *"a biodiversity section of an EIAR, should not repeat the detailed assessment of potential effects on European sites contained in a Natura Impact Statement"* but should *"incorporate their key findings as available and appropriate"*. Section 6.5.1.1 of this EIAR provides a summary of the key assessment findings with regard to European Designated Sites.

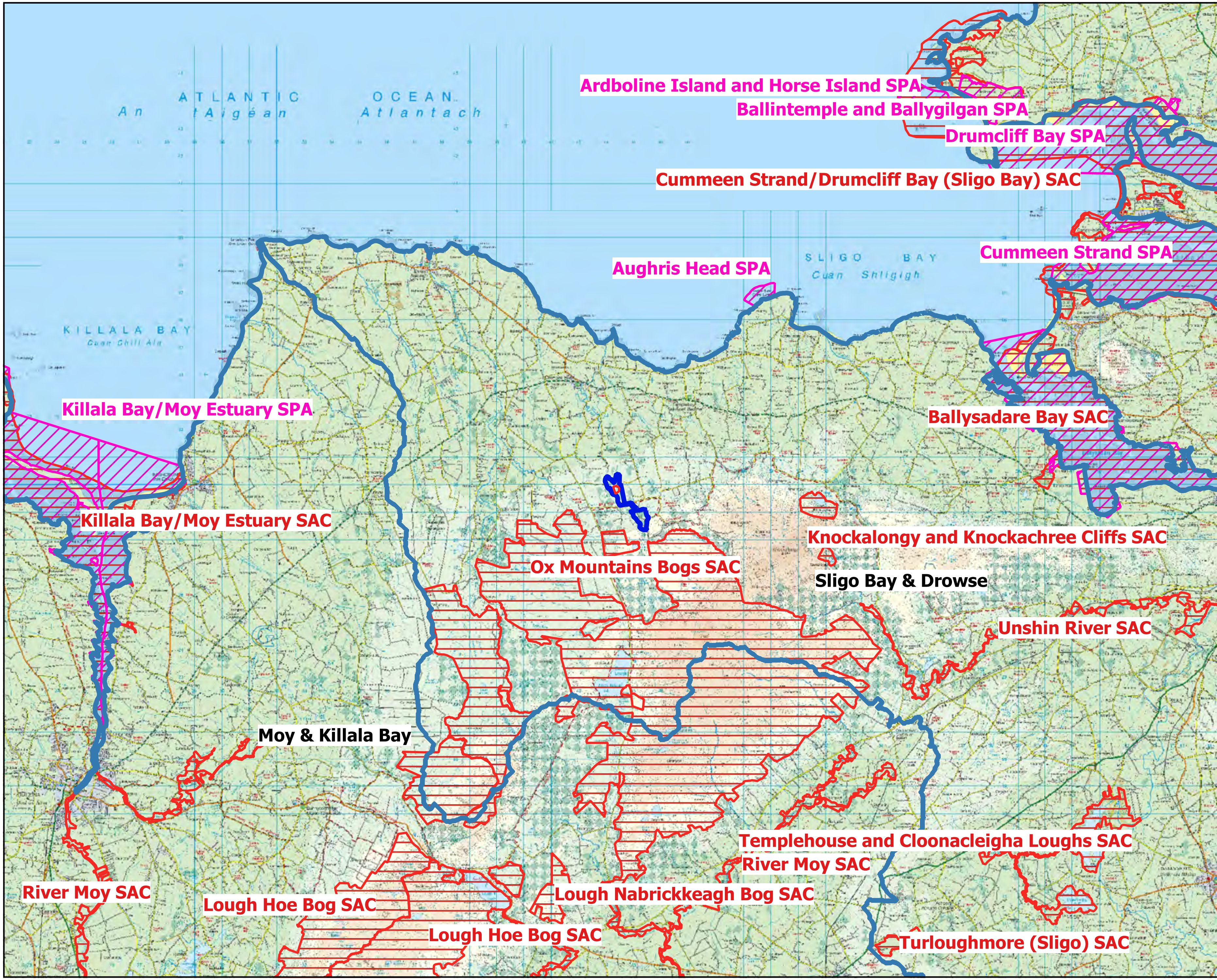
Natural Heritage Areas (NHAs) are designated under Section 18 the Wildlife (Amendment) Act 2000 and their management and protection is provided for by this legislation and planning policy. The potential for effects on these designated sites is fully considered in Chapter.

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 Chapter.

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

- Initially the most up to date GIS spatial datasets for European and Nationally designated sites and water catchments were downloaded from the NPWS website (www.npws.ie) and the EPA website (www.epa.ie) on the 20/05/2022. The datasets were utilised to identify Designated Sites which could feasibly be affected by the Proposed Development.
- Potential for connectivity with European or Nationally designated sites from the Proposed Development was considered in this initial assessment. No potential connectivity with any sites over 15km from the Proposed Development was identified, and this distance was judged to be an appropriate distance for further assessment of potential pathways for effect.
- A map of all the European Sites within 15km is provided in Figure 6.4 with all Nationally designated sites shown in Figure 6.5.
- Table 6-3 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 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 20/05/2022.

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



Map Legend

- EIAR Site Boundary
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)
- WFD Catchment

N

Drawing Title: European Designated Sites	
Project Title: Dunneill Wind Farm Extension of Operation	
Drawn By: KOD	Checked By: SM
Project No.: 210207	Drawing No.: Figure 6.4
Scale: 1:180,000	Date: 2022-07-07

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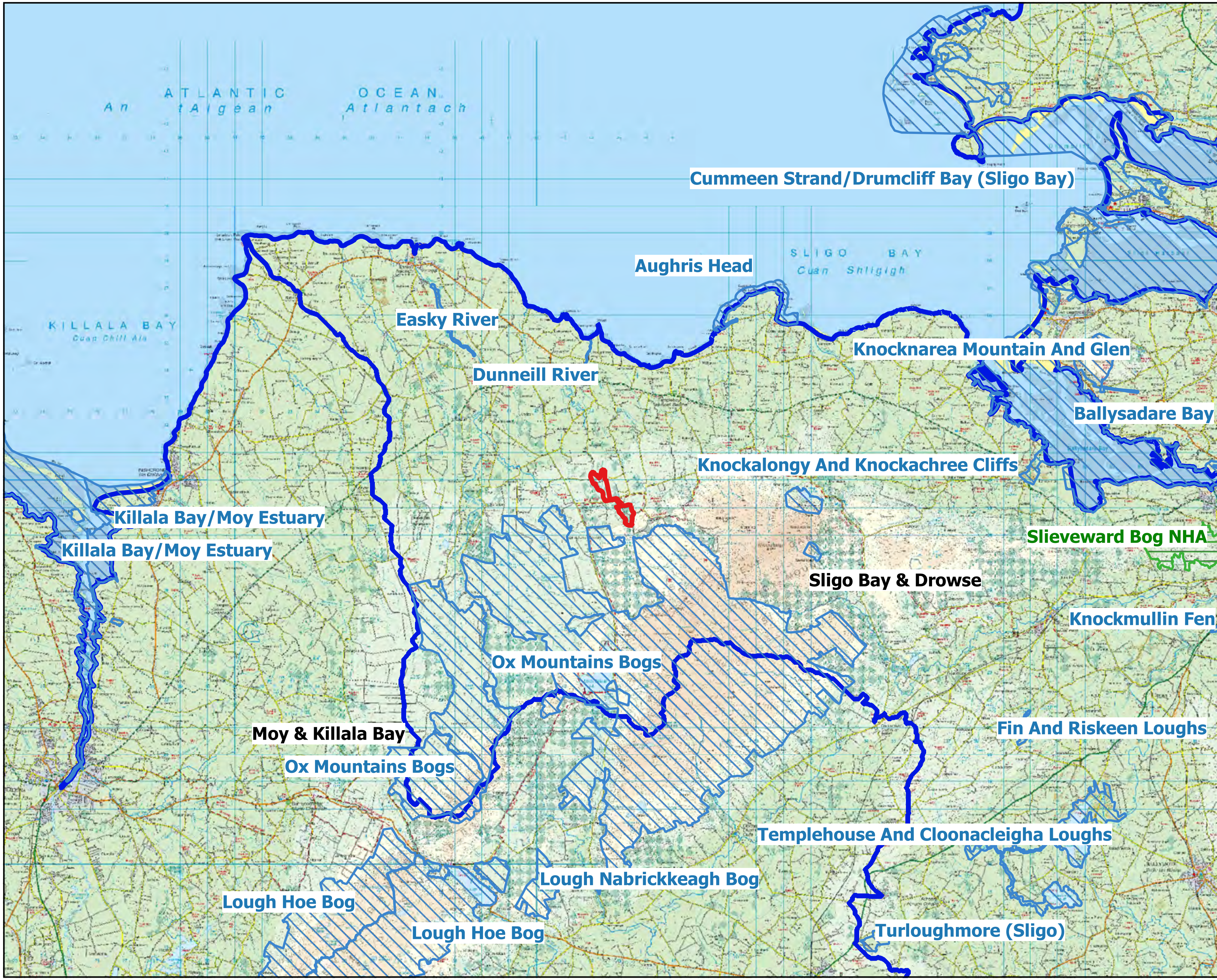

Map Legend

- EIAR Site Boundary
- Natural Heritage Area (NHA)
- Proposed Natural Heritage Area (pNHA)
- WFD Catchments

N

Drawing Title: Nationally Designated Sites	
Project Title: Dunneill Wind Farm Extension of Operation	
Drawn By: KOD	Checked By: SM
Project No.: 210207	Drawing No.: Figure 6-5
Scale: 1:180,000	Date: 2022-07-07

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Table 6-3: Identification of designated sites within the Likely Zone of Impact

Designated Site	Distance from Proposed Development (km)	Likely Zone of Impact Determination
Special Area of Conservation		
Ox Mountains Bog SAC [0020069]	A small section of the SAC is located within the existing wind farm site boundary	A small section of the SAC is located within the windfarm site boundary. The proposed development consists of the extension of the operational life of an existing windfarm. During the operational phase, the windfarm will continue to operate as it has done since it became operational in 2010. There will be no construction works and therefore no potential for direct habitat loss or run-off of pollutants due to construction activities. No natural drainage features will be altered and there will be no direct or indirect discharges to natural watercourses during the continued operation of the wind farm. Taking a highly precautionary approach, a potential pathway for indirect effects on the SAC during the operational phase (including during routine maintenance works) and decommissioning phase, due to deterioration of water/habitat quality resulting from the accidental spillage of pollutants was identified. **This SAC is therefore within the likely Zone of Likely Impact and following the precautionary principle further assessment is required.**
Knockalongy and Knockachree Cliffs SAC [001669]	5.5km	These SACs are located > 5km (closest SAC) from the proposed development site. There will be no direct effects on these SACs as a result of the extension of the operational life of the existing windfarm. There is no connectivity between the proposed development site and these SACs. There will be no construction works as part of the proposed development and the existing windfarm will continue to operate under its current conditions. No pathway for significant indirect effects on these SACs as a result of the extension of the operational life and the decommissioning of the existing windfarm was identified. **These sites are not located within the Zone of Likely Impact and no further assessment is required**
Unshin River SAC [001898]	8.2km	
River Moy SAC [002298]	10.8km	
Lough Nabrickkeagh Bog SAC [000634]	12.2km	
Ballysadare Bay SAC [000622]	13.2km	
Lough Hoe Bog SAC [000633]	13.9km	
Special Protection Area (SPA)		
Aughris Head SPA [004133]	7.8km	There is no hydrological connectivity between the proposed development and this coastal SPA. The site does not provide suitable habitat for the coastal SCI species for which the SPA

Designated Site	Distance from Proposed Development (km)	Likely Zone of Impact Determination
		is designated. No source-pathway-receptor chain for indirect effects was identified. **These sites are not located within the Zone of Likely Impact and no further assessment is required**
Ballysadare Bay SPA [004129]	13.2km	There is no hydrological connectivity between the proposed development and the SPA. Therefore, no potential for indirect effect on supporting wetland habitat for SCI bird species due to deterioration in water quality exists. There is no suitable significant foraging habitat within the development boundary and therefore no potential for ex-situ foraging effects on any SCI species. **These sites are not located within the Zone of Likely Impact and no further assessment is required**
Proposed Natural Heritage Area (pNHA)		
Ox Mountains Bogs pNHA	424.7m	There is no potential for direct effects as the pNHA is entirely outside the site boundary. The pNHA is upstream of the site, therefore no source-pathway-receptor chain for indirect effects was identified. **This site is not within the likely zone of impact.**
Dunneill River	3.4km	The Dunneill River flows through the site boundary. The section of Dunneill River designated as part of this pNHA is located approximately 4.6km downstream from the site. Taking a precautionary approach, a potential pathway for indirect effects on the pNHA due to deterioration of surface and groundwater quality resulting from run-off of pollutants during the operational phase of the windfarm was identified. **The site is within the likely zone of impact and further consideration is required.**
Aughris Head	6.5km	There is no hydrological connectivity between the proposed development and these pNHAs. No source-pathway-receptor chain for indirect effects was identified. **These sites are not within the likely zone of impact.**
Knockalongy and Knockachree Cliffs	5.6km	
Easky River	6km	
Lough Nabrickkeagh Bog	12.2km	

Designated Site	Distance from Proposed Development (km)	Likely Zone of Impact Determination
Ballysadare Bay	13.2km	
Lough Hoe Bog	13.9km	

6.5.1.2 NPWS Article 17 Reporting

A review of the Irish Reports for Article 17 of the Habitats Directive (92/42/EEC), including the Heath, Bogs and Mires, Irish Semi-Natural Grassland Survey datasets, National Survey of Native Woodlands and Ancient and Long-Established Woodland datasets was carried out as part of this assessment (reviewed 20/05/2022).

Available NPWS datasets were downloaded and overlain on the proposed development site boundary. A section of the Ox Mountains Bogs SAC is located within the north of the site. There are two Article 17 mapped habitats located within this section of the SAC within site boundary. These include Active blanket bog [7130] and Northern Atlantic wet heaths with *Erica tetralix* [4010].

6.5.1.3 Vascular plants

A search was made in the New Atlas of the British and Irish Flora (Preston *et al*, 2002) to investigate whether any rare or unusual plant species listed under Annex II of the EU Habitats Directive, All-Ireland Red List – No. 10 Vascular Plants (Wyse Jackson *et al.*, 2016) or the Flora (Protection) Order (1999, as amended 2015) had been recorded in the relevant 10km squares in which the study site is situated (G42 and G43). Each hectad contains 100 whole one kilometre squares containing terrestrial habitats. Species of conservation concern are given in Table 6-4**. No species listed in Annex II of the Habitats Directive or the Flora (Protection) Order are shown in the atlas for squares G42 and G43.**

Table 6-4: Species listed designated under the Flora Protection Order or the Irish Red Data Book within Hectad G42 & G43

Common Name	Scientific Name	Hectad	Status
Common moonwort	*Botrychium lunaria*	G43	NT
Good King Henry	*Chenopodium bonus-henricus*	G43	VU
Corn marigold	*Chrysanthemum segetum*	G42, G43	NT
Autumn gentian	*Gentianella amarella*	G42	NT
Field gentian	*Gentianella campestris*	G42	NT
Heath cudweed	*Gnaphalium sylvaticum*	G42	FPO, EN
Bog orchid	*Hammarbya paludosa*	G42	FPO, NT
Common toadflax	*Linaria vulgaris*	G43	NT
Dwarf willow	*Salix herbacea*	G42	NT
Shepherd's needle	*Scandix pecten-veneris*	G43	RE

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

6.5.1.4 Bryophytes

A search of the NPWS online database for bryophytes (non-vascular land plants comprising of mosses, hornworts and liverworts) was also undertaken in May 2022 with no protected bryophytes recorded within or adjacent to the Proposed Development.

6.5.1.5 National Biodiversity Data Centre (NBDC) Records

A search of the National Biodiversity Data Centre (NBDC) website was conducted on the 08/04/2022. This helped to inform survey effort and provide a baseline of likely species composition in the area. Records of protected fauna recorded from hectads G42 and G43 are provided in Table 6-5 and Table 6-6.

Table 6-5: NBDC records for protected fauna records (excl. birds).in hectads G42 and G43

Common name	Scientific name	Designation	Hectad
Large white-moss	*Leucobryum glaucum*	HD Annex IV	G42
Common bottlenose dolphin	*Tursiops truncatus*	HD Annex II, IV, WA	G43
Common frog	*Rana temporaria*	HD Annex V, WA	G42, G43
Fin whale	*Balaenoptera physalus*	HD Annex IV, WA	G43
Grey seal	*Halichoerus grypus*	HD Annex II, V, WA	G43
Leisler's bat	*Nyctalus leisleri*	HD Annex IV, WA	G43
Daubenton's bat	*Myotis daubentonii*	HD Annex IV, WA	G42, G43
Geyer's whorl snail	*Vertigo (Vertigo) geyeri*	HD Annex II, WA	G42
Minke whale	*Balaenoptera acutorostrata*	HD Annex IV, WA	G43
Short-beaked common dolphin	*Delphinus delphis*	HD Annex IV, WA	G43
Soprano pipistrelle	*Pipistrellus pygmaeus*	HD Annex IV, WA	G43
Sowerby's beaked whale	*Mesoplodon bidens*	HD Annex IV, WA	G43
Striped dolphin	*Stenella coeruleoalba*	HD Annex IV, WA	G43
Irish hare	*Lepus timidus subsp. hibernicus*	HD Annex V, WA	G42, G43
Iris stoat	*Mustela erminea subsp. hibernica*	WA	G43
Otter	*Lutra lutra*	HD Annex II, IV, WA	G42, G43
Pine marten	*Martes martes*	HD Annex V, WA	G42, G43
West European Hedgehog	*Erinaceus europaeus*	WA	G43

Common name	Scientific name	Designation	Hectad
Badger	*Meles meles*	WA	G42, G43

Table 6-6: NBDC records for Birds hectads G42 and G43

Common name	Scientific name	Designation	Hectad
Barn owl	Tyto alba	RL	G43
Barnacle goose	*Branta leucopsis*	Annex I	G42
Chough	*Pyrrhocorax pyrrhocorax*	Annex I	G43
Common tern	*Sterna hirundo*	Annex I	G43
Corncrake	*Crex crex*	Annex I, RL	G43
Curlew	*Numenius arquata*	RL	G43
Dunlin	*Calidris alpina*	Annex I, RL	G42, G43
Golden plover	*Pluvialis apricaria*	Annex I, RL	G42, G43
Great northern diver	*Gavia immer*	Annex I	G43
Grey plover	*Pluvialis squatarola*	RL	G43
Grey wagtail	*Motacilla cinerea*	RL	G42, G43
Hen harrier	*Circus cyaneus*	Annex I	G42, G43
Kestrel	*Falco tinnunculus*	RL	G42, G43
Kittiwake	*Rissa tridactyla*	RL	G43
Knot	*Calidris canutus*	RL	G43
Whooper swan	*Cygnus cygnus*	Annex I	G42, G43
Lapwing	*Vanellus vanellus*	RL	G43
Long-tailed duck	*Clangula hyemalis*	RL	G43
Meadow pipit	*Anthus pratensis*	RL	G42, G43
Merlin	*Falco columbarius*	Annex I	G42, G43
Oystercatcher	*Haematopus ostralegus*	RL	G43
Peregrine	*Falco peregrinus*	Annex I	G42
Purple sandpiper	*Calidris maritima*	RL	G43
Razorbill	*Alca torda*	RL	G43

Common name	Scientific name	Designation	Hectad
Red grouse	*Lagopus lagopus*	RL	G42, G43
Redshank	*Tringa totanus*	RL	G43
Red-throated diver	*Gavia stellata*	Annex I	G43
Redwing	*Turdus iliacus*	RL	G42, G43
Snipe	*Gallinago gallinago*	RL	G42, G43
Stock dove	*Columba oenas*	RL	G43
Swift	*Apus apus*	RL	G43
Whinchat	*Saxicola rubetra*	RL	G43
Woodcock	*Scolopax rusticola*	RL	G42, G43
Yellowhammer	*Emberiza citrinella*	RL	G42, G43

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

6.5.1.6 Bat Records

An information request form was sent to Bat Conservation Ireland to gather information on bat roosts and species composition within 1km and 10km of a central point within the Northern and Southern Study Areas (Grid Ref: E144797 N329265). Available bat records were provided by Bat Conservation Ireland on 16/06/2022. The search yielded no results of roosts within a 1km radius of the Proposed Development. The search was extended to include a 10km radius including roosts, transects and ad-hoc observations. Two roosts were recorded within 10km. A number of transects (n=2) and ad-hoc observations (n=25) have been recorded. At least six of Ireland's nine resident bat species were recorded within 10 km of the proposed works including common and soprano pipistrelle, Leisler's bat, Daubenton's bat, Natterer's bat and brown long-eared bat, as well as several records of unidentified bats. The results of the database search are provided in Table 6-7.

Table 6-7: National Bat Database of Ireland records within 10km

Record	Species	Grid Reference	Date	Locations/ Surveys
Within 10km of Proposed Development				
Roost	*Myotis spp.*	-	N/A	Leekfield Bridge, County Sligo
	Plecotus auritus	-	N/A	Screen, County Sligo
Transect	*Myotis daubentonii, Pipistrellus pygmaeus, Nyctalus leisleri*	G5310034300	N/A	Ardnaglass Bridge Transect
	Nyctalus leisleri, Pipistrellus pygmaeus, Pipistrellus pipistrellus (45kHz), Myotis spp.	G392258	N/A	Woodrow Sustainable Solutions
Ad-hoc	*Myotis daubentonii*	G4489723734	26/09/2009	BATLAS 2010
	Pipistrellus pygmaeus, Nyctalus leisleri	G488337	26/09/2009	BATLAS 2010
	Myotis daubentonii, Pipistrellus pygmaeus	G437325	26/09/2009	BATLAS 2010
	Nyctalus leisleri	G531343	25/09/2009	BATLAS 2010
	Pipistrellus pygmaeus	G511307	25/09/2009	BATLAS 2010
	Myotis daubentonii, Pipistrellus pygmaeus	G364354	29/09/2009	BATLAS 2010
	Unidentified bat, Pipistrellus spp. (45kHz/55kHz)	G393317	25/09/2009	BATLAS 2010

Record	Species	Grid Reference	Date	Locations/ Surveys
	Pipistrellus pygmaeus	G5292520503	09/07/2017	BATLAS 2020
	Pipistrellus pygmaeus, Nyctalus leisleri	G5390227058	08/07/2017	BATLAS 2020
	Pipistrellus pygmaeus, Myotis daubentonii	G3520329478	20/08/2018	BATLAS 2020
	Pipistrellus pygmaeus	G4212629629	18/05/2018	BATLAS 2020
	Pipistrellus pygmaeus, Myotis natterreri, Myotis spp.	G5104931623	03/08/2017	BATLAS 2020
	Pipistrellus pygmaeus	G5076032491	18/05/2018	BATLAS 2020
	Pipistrellus pipistrellus (45kHz)	G4482632733	07/09/2017	BATLAS 2020
	Pipistrellus pygmaeus, Myotis spp.	G4630333118	18/05/2018	BATLAS 2020
	Pipistrellus pipistrellus (45kHz), Pipistrellus pygmaeus, Nyctalus leisleri, Myotis daubentonii	G5346633318	03/08/2017	BATLAS 2020
	Pipistrellus pipistrellus (45kHz), Pipistrellus pygmaeus, Myotis daubentonii	G3991833328	18/05/2018	BATLAS 2020
	Pipistrellus pipistrellus (45kHz), Pipistrellus pygmaeus	G4318333687	07/09/2017	BATLAS 2020
	Pipistrellus pygmaeus	G4388635121	07/09/2017	BATLAS 2020
	Pipistrellus pygmaeus	G4905935200	04/08/2017	BATLAS 2020
	Pipistrellus pygmaeus	G5092035216	03/08/2017	BATLAS 2020
	Pipistrellus pygmaeus, Nyctalus leisleri	G4137035417	07/09/2017	BATLAS 2020
	Pipistrellus pygmaeus	G5038635710	03/08/2017	BATLAS 2020
	Pipistrellus pygmaeus	G4928635792	04/08/2017	BATLAS 2020
	Pipistrellus pipistrellus (45kHz), Pipistrellus pygmaeus, Myotis spp.	G3854336057	18/05/2018	BATLAS 2020

6.5.1.7 NPWS Protected Species Records

National Parks and Wildlife Service (NPWS) online records were searched to see if any rare or protected species of flora or fauna have been recorded from hectads G42 and G43. An information request was also sent to the NPWS scientific data unit requesting records from the Rare and Protected Species Database on the 12th of April 2022. A response was received on the 14th of April 2022. Table 6-8 lists rare and protected species records obtained from NPWS.

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

Common name	Scientific name	Designation	Hectad
Acute-leaved Bog-moss	*Sphagnum capillifolium subsp. capillifolium*	HD Annex V	G42
Badger	*Meles meles*	WA	G42, G43
Bantry Notchwort	*Leiocolea bantriensis*	NT	G42
Big-spored Rock-moss	*Andreaea megistospora*	VU	G42
Bog orchid	*Hammarbya paludosa*	FPO, NT	G42
Common frog	*Rana temporaria*	HD Annex V, WA	G42, G43
Fine Bog-moss	*Sphagnum angustifolium*	HD Annex V	G42

Common name	Scientific name	Designation	Hectad
Fir Clubmoss	*Huperzia selago*	HD Annex V	G42
Flat-leaved Bog-moss	*Sphagnum platyphyllum*	HD Annex V, NT	G42
Freshwater Pearl Mussel	*Margaritifera margaritifera*	HD Annex II, V, WA, CR	G42
Geyer's whorl snail	*Vertigo geyeri*	HD Annex II, VU	G42
Girgensohn's Bog-moss	*Sphagnum girgensohnii*	HD Annex V, NT	G42
Heath Cudweed	*Gnaphalium sylvaticum*	FPO, EN	G42
Irish hare	*Lepus timidus subsp. Hibernicus*	HD Annex V, WA	G42, G43
Large white-moss	*Leucobryum glaucum*	HD Annex V	G42
Leathery turtle	*Dermocheles coriacea*	HD Annex IV, WA	G43
Otter	*Lutra lutra*	HD Annex II, IV, WA	G42, G43
Pale bog-moss	*Sphagnum strictum*	HD Annex V	G42
Pine marten	*Martes martes*	HD Annex V, WA	G42
Reindeer lichen	*Cladonia ciliata*	HD Annex V	G42
Reindeer lichen	*Cladonia ciliate var. tenuis*	HD Annex V	G42
Reindeer lichen	*Cladonia portentosa*	HD Annex V	G42
Reindeer moss	*Cladina rangiferina*	HD Annex V	G42
Rigid Bog-moss	*Sphagnum teres*	HD Annex V, NT	G42
Shepherd's-needle	*Scandix pecten-veneris*	RE	G43
Smooth newt	*Lissotriton vulgaris*	WA	G43
Striped dolphin	*Stenella coeruleoalba*	HD Annex IV, WA, NE	G43
Toothed Streak-moss	*Rhabdoweisia crispata*	NT	G42
Yellow-bud grimmia	*Grimmia anomola*	EN	G42

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

6.5.1.8 Inland Fisheries Ireland Data

The IFI online database was reviewed for fish species records within the catchments downstream of the site. The Proposed Development site drains into both the Dunneill River and the Doonbeakin Stream. The Doonbeakin Stream flows through Ox Mountains Bogs SAC within the north of the site and feeds into the Dunneill further downstream. A search of the Inland Fisheries Ireland (IFI) online database was carried out to determine the species richness of the Dunneill River and Doonbeakin Stream.

Fish stock assessments were undertaken by IFI in 2009 and 2012 for the Dunneill River. The Dunneill River located within the Sligo Bay water catchment is hydrologically connected to the Proposed Development. IFI conducted a survey at Dromore West on the Dunneill River. Aquatic species recorded included European eel (*Anguilla anguilla*) and brown trout (*Salmo trutta*). These species were also recorded in the Dunneill River at Donaghintraine Bridge along with three-spined stickleback.

European eel (*Anguilla Anguilla*), is classified as 'critically endangered' in 'Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish' (King *et al.*, 2011). Lamprey (Lampetra sp.) are classified as 'near threatened' in 'Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish' (King et al., 2011). All three species of Irelands lamprey are protected under Annex II of the EU habitats directive, with River Lamprey classified under Annex II and Annex V. Salmon (in freshwater) is listed on Annexes II and V of the EU Habitats Directive, and is listed as "Vulnerable," on King *et al.*'s Red list (2011).

6.5.1.8.1 Water Quality

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. The site is located within the Sligo Bay WFD Catchment [Code: 35]. The EPA Envision map viewer was consulted on 11th April 2022 regarding the water quality status of the rivers which run within and directly adjacent to the site. The WFD River Waterbody Status 2013 – 2018 for the watercourses which flow through the site are listed in Table 6-9.

Table 6-9: Watercourses on site with relevant water quality statuses

Name	Location	Status	Risk
Doonbeakin Stream	Flowing from the north of the site, exiting in a northerly direction.	Good	Not at risk
Dunneill River	This is the main watercourse flowing through the site. It flows from the south of the site in a northerly direction through the site, exiting at the northernmost part of the site.	Good	At risk
Fiddandoo Stream	A tributary of the Dunneill River, the Fiddandoo stream, bisects the development in an east-west direction, with the access road to the southern section of Dunneill Wind Farm crossing this stream.	Good	At risk
Unnamed Stream	An unnamed stream flows east to west through the southern section of the Dunneill wind farm north of T13 downstream into the Dunneill River just west of the site.	Good	At risk

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

Table 6-10 illustrates the respective Q-value status results from monitoring stations located along rivers which flow through the site or along rivers which are fed directly by watercourses which flow through or adjacent to the site.

Table 6-10: Water quality monitoring stations and associated Q values

Watercourse Name	Sampling Station	Location	Sampling Year	Q-Value & Water Quality Status
Doonbeakin 35 [EPA Code: 35D09]	Ford u/s Dunneill River	E143886 N333943	2021	4 (Good)
	D/s Ford u/s Dunneill River confluence	E143851 N333970	1994	4-5 (High)
Dunneill 35 [EPA Code: 35D06]	Br E Water Treatment Works	E144487 N329237	2021	4-5 (High)
	Donaghintraine Bridge	E14387 N334344	2021	4 (Good)

6.5.1.9 Invasive Species

The NBDC database also contains records of invasive species identified within the relevant hectad. Records of invasive species listed in the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) for hectads G42 and G43 are provided in Table 6-11.

Table 6-11: NBDC records for invasive species (hectads G42 and G43)

Common Name	Scientific Name	Hectad
American mink	*Mustela vison*	G43
Flatworm (Turbellaria)	*Arthurdendyus triangulatus*	G43
Himalayan knotweed	*Persicaria wallichii*	G43
Japanese knotweed	*Fallopia japonica*	G43

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. Himalayan knotweed (*Persicaria wallichii*), Japanese knotweed (*fallopian japonica*) and American mink (*Mustela vison*) are three species subject to restrictions under Regulations 49 and 50 and are included in the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011).

6.5.1.10 Freshwater Pearl Mussel (*Margaritifera margaritifera*)

The site is not located within any *Margaritifera* catchment. The NPWS *Margaritifera* Sensitive Area map (Version 8, 2017) was consulted during the desk study. There is no surface water connectivity between the Proposed Development site and any *Margaritifera* catchment.

The Proposed Development site boundary is located 2.2km northeast of the Easky *Margaritifera* Sensitive Area, 4.7km northwest of the Moy *Margaritifera* Sensitive Area, with no connectivity to either.

6.5.1.11 Geyer's Whorl Snail (*Vertigo (Vertigo) geyeri*)

Geyer's whorl snail is a Qualifying Interest of Ox Mountains Bogs SAC, a small section of which is located within the site boundary. The closest NBDC records for geyer's whorl snail were located within this section of the SAC within the site boundary. However, the records for the species lie outside of the windfarm infrastructure footprint.

6.5.1.12 Conclusions of the Desktop Study

The desktop study has provided information about the existing environment in Hectad G42 and G43 within which the Proposed Development site is located. The Proposed Development site drains into the Dunneill River and Doonbeakin Stream. A small section of the Ox Mountains SAC is located within the proposed development site. The Doonbeakin Stream flows through Ox Mountains Bogs SAC and is further considered in the Natura Impact Statement prepared for the Proposed Development: The Dunneill River pNHA is located downstream of the site. There is potential for effects on this site. These designated sites are considered further in **Section 6.7.3.1**.

The desk study identified that a variety of protected faunal species are known to occur within and in proximity to the site, including bats, geyer's whorl snail, otter and badger. The mammal species recorded during the desk study informed the survey methodologies undertaken during the site visits. The mammal species recorded within the relevant hectad have widespread range and distributions in Ireland and are likely to be recorded frequently throughout Ireland (Marnell *et al*, 2009[7]). The site is not located within a freshwater pearl mussel 'sensitive area'.

The desk study also provided useful information to inform the ecological surveys undertaken on site as well as the identification of pathways for potential impact on sensitive ecological receptors.

6.6 Ecological Walkover Survey Results

6.6.1 Description of Habitats, Flora & Fauna within the Ecological Survey Area

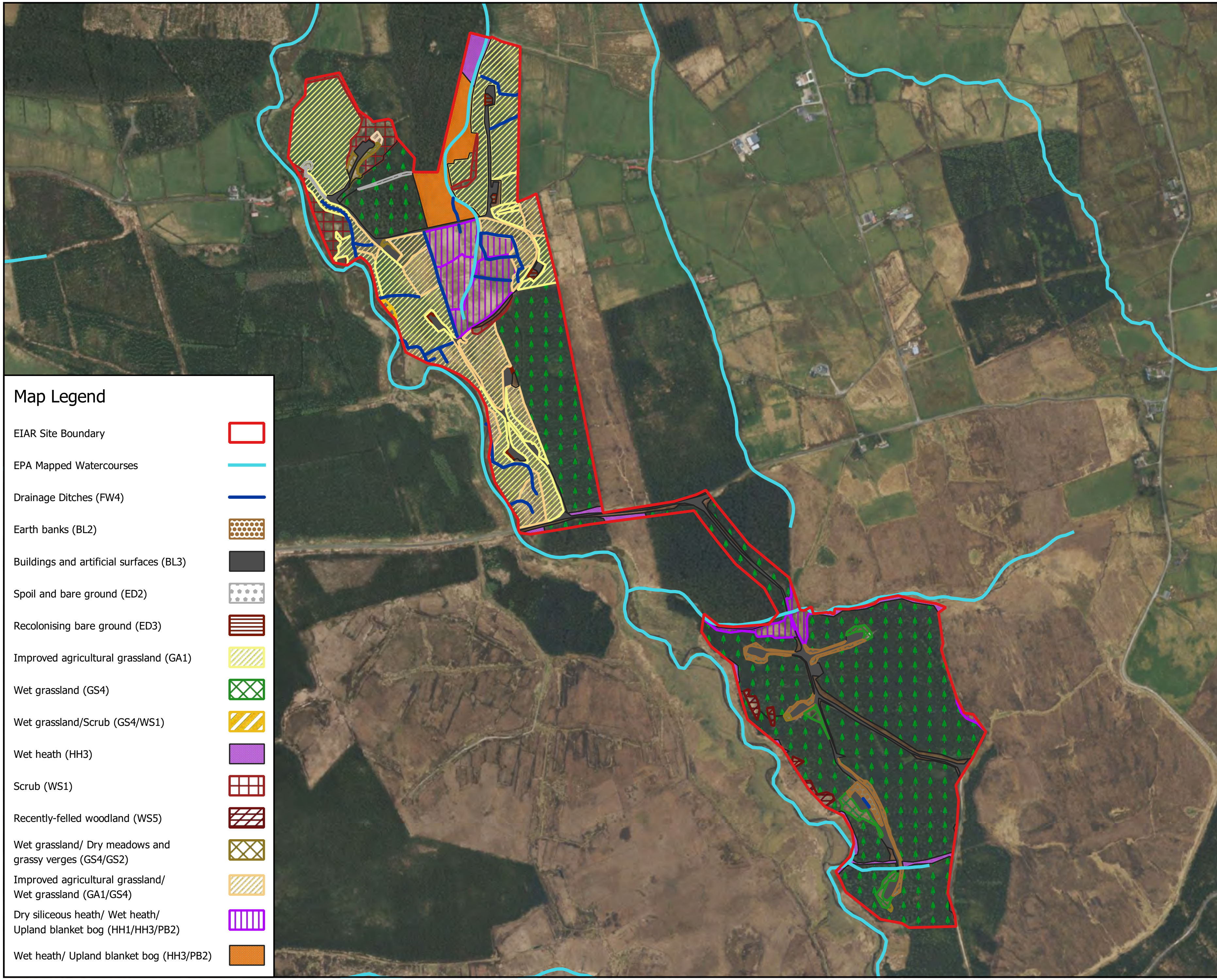
A total of fifteen habitats were recorded within the Proposed Development site (Table 6-12), some of which form mosaics with each other. A habitat map of the site is provided in Figure 6-6.

Table 6-12: Habitats recorded on the Proposed Development site

Habitat Name	Fossitt Code
Earth banks	BL2
Buildings and artificial surfaces	BL3
Spoil and bare ground	ED2
Recolonising bare ground	ED3
Eroding/upland rivers	FW1
Drainage ditches	FW4
Improved agricultural grassland	GA1
Dry meadows and grassy verges	GS2
Wet grassland	GS4
Dry heath	HH1

[7] Marnell, 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.

Habitat Name	Fossitt Code
Wet heath	HH3
Upland blanket bog	PB2
Conifer plantation	WD4
Scrub	WS1
Recently-felled woodland	WS5



Drawing Title

Habitat Map

Project Title

Dunneill Wind Farm Extension of Operation

Drawn By	Checked By
KOD	SM
Project No. 210207	Drawing No. Figure 6.6
Scale 1:11,250	Date 2022-08-19

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6.6.1.1 Habitats within the Site Boundary

The site comprises the existing windfarm infrastructure, including turbines and associated hardstand areas and the windfarm access roads, which are classified as Buildings and artificial surfaces (BL3). Outside of the existing windfarm infrastructure the lands within the site boundary are dominated by areas of plantation forestry (WD4), comprising mainly of Sitka spruce (*Picea sitchenis*) and Lodgepole pine (*Pinus contorta)* to the south. To the north the site is comprised of improved agricultural grassland (GA1) with some conifer plantation (WD4), wet heath (HH3) and dry heath (HH1). The site is accessible via a network of local roads and the existing wind farm access tracks. A description of the main habitats within the site boundary is provided below.

6.6.1.1.1 *Buildings and Artificial Surfaces (BL3)*

The existing windfarm infrastructure, including turbines, buildings and road infrastructure on site, were classified under the habitat type buildings and artificial surfaces (BL3).

Plate 6-1: Hardstanding area and turbine (BL3)

6.6.1.1.2 *Earth Banks (BL2)*

Earth banks are present around the hardstanding bases of T9, T10, T11, T12 and T13 within the south of Dunneill wind farm. These earth banks are generally comprised of gravel that was deposited when building the turbines. These banks are generally covered by grassy verge, wet grassland and recolonising bare ground habitat. A range of species occur on the earth banks including yorkshire fog (*Holcus lanatus),* dandelion (*Taraxacum officinale* agg.), soft rush (*Juncus effusus*), creeping cinquefoil (*Potentilla reptans*), haircap moss (*Polytrichum* sp.) and compact rush (*Juncus conglomeratus*).

Plate 6-2: Earth banks (BL2) adjacent to T13.

6.6.1.1.3 Spoil and Bare Ground (ED2)

There is a worn dirt path through an improved agricultural grassland field west of T1. There is a dirt road within conifer plantation east of T1. These are both categorised as Spoil and bare ground (ED2).

Species recorded comprised mainly of sweet vernal grass (*Anthoxanthum odoratum*), daisy (*Bellis perennis*), dandelion (*Taraxacum officinale* agg.) and colt's-foot (*Tussilago farfara*).

6.6.1.1.4 Recolonising Bare Ground (ED3)

Small areas of this habitat are present, particularly surrounding the existing wind turbine bases in the North of the site (T1-T8). Examples of this habitat are usually in the form of small areas of gravel which have started to colonise with small herbaceous plants including daisy (*Bellis perennis*), dandelion (*Taraxacum vulgaria*), white clover (*Trifolium repens*), creeping thistle (*Cirsium arvense*), perennial rye grass (*Lolium perenne*), shepherd's purse (*Capsella bursa-pastoris*), creeping buttercup (*Ranunculus repens*), spear thistle (*Cirsium vulgare*), willowherb (*Epilobium* sp.), yorkshire fog (*Holcus lanatus*) and hairy bittercress (*Cardamine hirsute*).

Plate 6-3: Hardstanding area adjacent to a turbine that has become recolonised with herbaceous plants (ED3)

6.6.1.1.5 *Eroding/ Upland Rivers (FW1)*

The site is drained by the Dunneill River, Doonbeakin stream and Fiddandoo stream. These watercourses are generally small (approx. 2m to 4m wide), fast flowing and with a predominantly boulder and cobble substrate.

The Fiddandoo stream bisects the development in an east-west direction just north of T9 and T10. This stream flows into the Dunneill River outside the site boundary. A small unnamed tributary of the Dunneill River also flows east to west into the Dunneill River just north of T13.

The Dunneill River flows adjacent to the entire western boundary of the site from south to north. The river was fast flowing and included areas of both riffle and glide. The substrate comprised bedrock, boulder, cobble, gravel and fine gravel. The River was approximately 4m wide.

The Doonbeakin stream flows northwards within the northeastern extent of the site boundary. Within the site the stream was bordered by heath habitat and as it flows further north the bankside vegetation was dominated by rushes (*juncus* sp.), and gorse (*Ulex europaeus*). As the stream exits the site boundary at its northern extent it is bordered by conifer plantation to the west and recently felled forestry to the east.

Plate 6-4: Dunneill River upstream of the Dunneill Wind Farm.

A summary of watercourses that drain the EIAR site boundary is provided in Section 4.5, Chapter 4 of the EIAR. A detailed description of the watercourses is provided in Chapter 9, Section 9.3.3.2.

6.6.1.1.6 Drainage Ditches (FW4)

Drainage ditches are present throughout the site draining the hardstanding areas around the turbines, the agricultural and heath lands in the north and the conifer plantations in the south. The ditches were generally small, approximately 1m in width and vegetated. At the time of surveying some were dry, and others contained a small amount of water that flowed slowly.

Plate 6-5: Drainage ditch in the north of the site flowing through grassland near T8.

6.6.1.1.7 Improved Agricultural Grassland (GA1)

A number of improved agricultural grassland fields grazed by sheep are present at the northern extent of the site, in proximity to turbines T1-T8 often in a mosaic with wet grassland habitat. It is the dominant habitat type in the north of the site. It generally comprises perennial ryegrass (*Lolium perenne*) and Yorkshire fog (*Holcus lanatus*) along with meadow thistle (*Cirsium dissectum*), white clover (*Trifolium repens*) and creeping buttercup (*Ranunculus repens*).

Plate 6-6: Improved agricultural grassland within the north of the site

6.6.1.1.8 Dry Meadows and Grassy Verges (GS2)

This habitat often occurs adjacent to the hardstanding surrounding the turbine bases, along the road network through the site and on earth banks near the turbines. It occasionally occurs as a mosaic with wet grassland surrounding the turbines. This habitat contained false oat-grass (*Arthenatherum elatius*), creeping cinquefoil (*Potentilla reptans*), Yorkshire fog (*Holcus lanatus*), daisy (*Bellis perennis*), tormentil (*Potentilla erecta*) and black medic (*Medicago lupulina*).

Plate 6-7: Dry meadows and grassy verges (GS2) located adjacent to hardstanding areas in the south of the site

6.6.1.1.9 Wet Grassland (GS4)

Wet grassland is present in proximity to T10, T11, T12 and T13. Species within the wet grassland included soft rush (*Juncus effusus*), creeping buttercup (*Ranunculus repens*) and sedges (*Carex spp*). This habitat occurs frequently in mosaics with dry meadows and grassy verges around the hardstanding areas surrounding turbine bases. This habitat is also frequently found in a mosaic with improved agricultural grassland in the north of the site. These lands are subject to agricultural management and are 'improved' with species such as perennial ryegrass (*Lolium perenne*) and yorkshire fog (*Holcus lanatus*) dominating along with regularly occurring soft rush (*Juncus effusus*), broad leaved dock (*Rumex obtusifolius*) and common sorrel (*Rumex acetosa*).

Other species recorded in this habitat include compact rush (*Juncus conglomeratus*) and occasional occurrences of *Polytrichum commune* (moss), water figwort (*Scrophularia auriculata*), willowherb (*Epilobium sp.*), common dog violet (*Viola riviniana*), lesser hawkbit (*Leontodon saxatilis*), heath bedstraw (*Galium saxatile*), creeping buttercup (*Ranunculus repens),* white clover (*Trifolium repens*) and willow (*Salix* sp.). The ground layer also contains a high proportion of mosses such as neat feather-moss (*Pseudoscleropodium purum*) and (*Rhytidiadelphus squarrosus*) due to the underlying wet conditions.

Plate 6-8: Wet grassland area in the south of the site

6.6.1.1.10 Dry Heath (HH1)

This habitat occurs in a mosaic with wet heath and upland blanket bog in the north of the site. This area in which this habitat occurs is part of the Ox Mountains Bogs SAC. Species included bell heather (*Erica cinerea*), tormentil (*Potentilla erecta*), Yorkshire fog (*Holcus lanatus*) and *agrostis* spp.

This habitat conforms to the Annex I habitat European dry heaths [4030].

6.6.1.1.11 Wet Heath (HH3)

This habitat occurs in a mosaic with dry heath and upland blanket bog in the north of the site in the Ox Mountains Bogs SAC. Wet heath is also present as small patches in other areas throughout the site, generally along road edges or at the boundary of the site bordering conifer plantations. Wet heath habitat borders large sections of the Dunneill River just west of the site. Species present included purple moor-grass (*Molinia caerulea*), Shagnum sp., heath milkwort (*Polygala serpyllifolia*) and common cottongrass (*Eriophorum angustifolium*). The majority of this habitat was relatively dry in nature and dominated by abundant purple moor grass with a low abundance of Sphagnum however ling heather and common cottongrass were also common in small sections of this habitat. The areas of wet heath habitat have potential to conform to the Annex I habitat Northern Atlantic wet heaths with *Erica tetralix* [4010].

6.6.1.1.12 Upland Blanket Bog (PB2)

This habitat occurs in a mosaic with dry heath and wet heath in the north of the site. This area is part of the Ox Mountains Bogs SAC.

Other small areas of this habitat occurring as a mosaic with wet heath are present within the site boundary but outside the SAC. Species present included purple moor-grass (*Molinia caerulea*), Sphagnum sp. and common cottongrass (*Eriophorum angustifolium*). The areas of this habitat were relatively dry in nature and dominated by abundant purple moor grass with a low abundance of Sphagnum. This blanket bog habitat within the site conforms to the Annex I habitat Blanket bogs (* if active bog) [7130].

Plate 6-9: Dry heath/ Wet heath/ Upland blanket bog mosaic to the east of T6 in Ox Mountains Bogs SAC

6.6.1.1.13 Conifer Plantation (WD4)

There is a mix of conifer forestry (WD4) of various ages within the site boundary. Conifer plantation dominates the southern extent of the site, surrounding T9 – T13. There is conifer plantation also located to the east of T7 and T8 and in between T1 and T3. Sitka spruce and Lodgepole pine are the dominant species, typically 8-10m tall. The understorey is typically species-poor in forestry plantations and vegetation normally restricted to bryophytes and ferns which include, hard fern (*Blechnum spicant*) and *Thuidium tamariscum*. The understory occasionally also contained wood sorrel (*Oxalis acetosella*).

Plate 6-10: Conifer plantation (WD4) in the south of the site

6.6.1.1.14 Scrub (WS1)

Scrub habitat occurs in patches in the northern extents of the site. Large area of scrub occurs in close proximity to T1 and T3. There is also a section of scrub dominated hedgerow northwest of T2. The scrub habitats are dominated by gorse (*Ulex europaeas*) and in wetter areas small areas of willow (*Salix* spp.) is also present.

Plate 6-11: Scrub (WS1) west of T2 in north of the site

6.6.1.1.15 *Recently-felled woodland (WS5)*

Small areas of conifer plantation in the western edge of the southern section of the site that have been recently felled are classified as Recently felled woodland.

6.6.1.2 Protected Flora

No botanical species listed under the Flora (protection) Order (1999, as amended 2015), listed in the EU Habitats Directive (92/43/EEC), or listed in the Irish Red Data Books were recorded on the site. All species recorded are common in the Irish landscape. No rare and protected plant species recorded in the desk study, including those obtained from NPWS data request, were recorded within the site.

6.6.1.3 Invasive species

During field surveys, a search for Invasive Alien Species (IAS) listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015) was conducted. No invasive species were found in proximity to any turbine sites. Therefore, no specific invasive species management plan is required.

No additional species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 were recorded during the surveys.

6.6.1.4 Evaluation of habitats

6.6.1.4.1 Peatland habitats

A mosaic of upland blanket bog (PB2), wet heath (HH3) and dry siliceous heath (HH1) are present in the north of the site within a section of Ox Mountains Bogs SAC. They have potential to conform with the Annex I habitats Blanket bogs (* if active bog) [7130], Northern Atlantic wet heaths with *Erica tetralix* [4010] and European dry heaths [4030]. These habitats are classed as International Importance as they are designated as part of Ox Mountains Bogs SAC.

6.6.1.4.2 Grassland habitats

Improved agricultural grassland (GA1), wet grassland (GS4), dry meadows and grassy verges (GS2) are present within the site. These habitats, although some contain small areas of semi-natural habitat that are of some local importance for wildlife are common and widespread in the local and wider landscape. Therefore, these habitats have been assessed as of Local Importance (Lower value)

6.6.1.4.3 Eroding/upland rivers (FW1), Drainage ditches (FW4) and associated aquatic habitats and related species

The Dunneill River flows adjacent to the western boundary of the site. An unnuamed stream and Fiddandoo stream flow from the site into the Dunneill River. The Doonbeakin Stream flows through the north of the site. These watercourses i.e. small streams and drainage ditches, have been assigned Local importance (Higher Value) as they are of high biodiversity value in a local context and provide connectivity to areas of higher biodiversity value in the wider landscape.

6.6.1.4.4 Conifer plantation (WD4) and Recently-felled woodland (WS5)

These habitats, although some contain small areas of semi-natural habitat that are of some local importance for wildlife are common and widespread in the local and wider landscape and are therefore assessed as local importance (lower value).

6.6.1.4.5 Scrub (WS1)

Scrub habitat within the site is largely dominated by gorse. This habitat is of local importance to local wildlife (NRA, 2009). It has been assigned as of local importance (higher value) as, although of high biodiversity value locally, it is common and widespread in the wider area.

6.6.1.4.6 Spoil and bare ground (ED2), Recolonising bare ground (ED3), Earth banks (BL2) & Buildings and artificial surfaces (BL3)

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

6.6.1.5 Fauna in the Existing Environment

Faunal surveys were undertaken on the 14th September 2021 and the 26th April 2022. In addition to the above survey dates, additional faunal signs/sightings were also recorded during other surveys including bat surveys and bird surveys.

The walkover survey was designed to detect the presence, or likely presence, of a range of protected species, including birds, bats, otter and badger. Potential suitable habitats were investigated for signs of animal presence. The following subsections provide a breakdown of the species recorded within the Proposed Development site boundary during the site visits and assessments.

6.6.1.5.1 Badger

During the surveys on the 26th April 2022 a comprehensive search for badger and signs of badger was undertaken. No badger or signs of badger including setts, latrines or tracks were recorded within the site of the proposed development. The Proposed Development will not result in a loss of any habitat for badger.

6.6.1.5.2 Otter

The watercourses within the site were surveyed for otter on the 26th April 2022. No signs of otter, including resting or breeding sites were recorded, however, the watercourses within and downstream of the site were assessed as providing suitable commuting and foraging habitat for the species and are likely to be utilised by otter, at least on occasion. There is potential for otter to utilise all watercourses within and downstream of the site for foraging and commuting. The Proposed Development will not result in a loss of any habitat for otter.

6.6.1.5.3 Bats

Bat surveys undertaken in 2021, in accordance with NatureScot (2021) (previously SNH, 2019), form the core dataset for the assessment of effects on bats. During these surveys, habitats within the site were assessed for their suitability to support roosting, foraging and commuting bats. Connectivity with the wider landscape was also considered.

Roost surveys

A search for roosts was undertaken within 200m plus the rotor radius (i.e. 26m) of the Proposed Development footprint (NatureScot, 2021). The aim was to determine the presence of roosting bats and the need for further survey work or mitigation. The site was visited in April, May, June and September 2021. A walkover was carried out and all structures and trees were assessed for their potential to support roosting bats.

Any potential roost sites were subject to a roost assessment. This comprised a detailed inspection of the exterior and interior (if accessible) to look for evidence of bat use, including live and dead specimens, droppings, feeding remains, urine splashes, fur oil staining and noises.

Any potential tree roosts were examined for the presence of rot holes, hazard beams, cracks and splits, partially detached bark, knot holes, gaps between overlapping branches and any other potential roost features (i.e. PRFs) identified by Andrews (2018).

Derelict Farmhouse and Associated Outbuildings

Three derelict structures, located within the EIAR Study Area, were subject to a dedicated interior and exterior roost inspection survey during daylight hours on the 26th April 2021.

The derelict comprised a farmhouse and two associated outbuildings. The farmhouse (Grid Ref: E144471 N329940) was comprised of stone with concrete walls and corrugated roofing. The farmhouse also contained an area of ivy coverage on the southwest corner. The associated outbuilding to the west consisted of stone walls and corrugated roofing with no insulation. The third structure to the east was comprised of stone and no longer had a roof attached.

Potential bat access points included gaps in the roofs, chimneys, timber fascia and open windows/doors. Crevices were also evident within the stonework of the two outer structures. There was a small separate attic space within the farmhouse, however no signs of bats were identified. No other evidence of bat use was identified in any of the derelict structures.

The farmhouse was assessed as having *Moderate* suitability for roosting bats i.e. A structure with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status. The two derelict outbuildings were assessed as having *Low* roosting suitability, i.e. A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (Collins, 2016).

Bat activity was observed around all three structures during the emergence survey on 24th June 2021; however, no bats were observed entering or leaving during emergence survey or manual transect surveys.

Onsite Electrical Control Building

The occupied onsite Electrical Control Building (Grid Ref: E145182 N328909) was comprised of concrete block walls with slate roof. This structure is in good condition and in regular use. The substation was assessed as having *Negligible* roosting suitability due to the lack of available PRFs, i.e. Negligible habitat features likely to be used by roosting bats (Collins, 2016).

No evidence of bats were identified during the daytime inspection and no bats were observed emerging or re-entering the Electrical Control Building during any of the manual transect surveys.

Active Farm Sheds (Outside EIAR Study Area)

The farm sheds located to the northwest of the site (Grid Ref: E143999 N329994) are comprised of concrete block walls and corrugated roofing with no insulation. The interiors of the structures were relatively exposed with gaps between the roof and the walls. There were also high levels of light penetration within the structures during the day. No evidence of bats were identified during the daytime inspection and no bats were observed emerging or re-entering the sheds during the dusk survey. The structure was assessed as have a *Negligible* to *Low* suitability, i.e. Negligible habitat features on site likely to be used by roosting bats (Collins 2016).

The structures were assessed as have a *Negligible* to *Low* suitability i.e. A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (Collins, 2016).

Manual transects 2021

Manual transects were undertaken in Spring, Summer and Autumn 2021. Bat activity was recorded on all surveys. A total of 381 bat passes were recorded. In general, Soprano pipistrelle (n=221) was recorded most frequently, followed the Common pipistrelle (n=146) and Leisler's Bat (n=13). Brown long-eared bat (n=1) was rare.

Species composition and activity levels varied significantly between surveys. Transect survey results were calculated as bat passes per km surveyed (to account for differences in survey effort).

Ground-level Static Surveys 2021

Where developments have more than 10 turbines, NatureScot requires 1 detector per turbine up to 10 plus 1 detector for every 3 additional turbines. Given that 13 existing turbines are present within the site, 13 detectors were deployed to ensure compliance with NatureScot guidance. No additional new turbines or alterations are proposed for the extension of operation planning application.

Automated bat detectors were deployed at 13 no. locations for at least 10 nights in each of spring (April - May), summer (June – mid-August) and autumn (mid-August - October) (NatureScot, 2021). Detector locations were based on turbine locations. The results of those surveys are provided below.

In total, 27,916 bat passes were recorded across all deployments. In general, soprano pipistrelle (n=15,448) occurred most frequently, followed by common pipistrelle (n=8,716), Leisler's bat (n=2,120) and *Myotis spp.* (n=1,451). Instances of brown long-eared bat (n=175) were significantly less, and Nathusius' pipistrelle (n=6) were rarely encountered.

Bat activity was calculated as total bat passes per hour (bpph) per season to account for any bias in survey effort, resulting from varying night lengths between seasons. Bat activity was dominated by the Soprano pipistrelle in spring and autumn and both Common and Soprano pipistrelle was the most common in summer. Instances of Leisler's bat and Mytois spp. were less frequent. Brown long-eared bat were relatively rare.

The Nightly Pass Rate (i.e. total bat passes per hour, per night) was used to determine typical bat activity at the Proposed Development site. Activity is often variable between survey nights. Therefore, the median Nightly Pass Rate was used as the most appropriate measure of bat activity (Lintott & Mathews, 2018).

Soprano pipistrelle bats were predominant at the majority of detectors during the spring and autumn survey periods. Summer activity varied at each detector with common pipistrelle and soprano pipistrelle as the dominant species.

Bat activity levels were objectively assessed against a reference dataset using Ecobat. Median activity levels for Soprano pipistrelle peaked at ***High*** for autumn. Median activity levels for common pipistrelle peaked at ***Moderate to High*** for summer, and Leisler's bat peaked at ***Moderate*** for spring and autumn. Median activity levels for Myotis spp. peaked at ***Moderate*** for two seasons. Brown long-eared bat peaked at ***Low to Moderate*** for two seasons. Maximum activity levels peaked with ***High*** activity for four species for at least one season, with the exception of brown long-eared bat, which peaked at ***Moderate to High.***

The Proposed Development will not result in a loss of any habitat for bats.

6.6.1.5.4 *Reptiles and Amphibians*

Common frog (*Rana temporaria*) was recorded in the area of peatland habitat within the northern section of the site and within watercourses on site. The species is likely to breed in drainage ditches and areas of permanent standing water within the site. Common lizard (*Zootoca vivipara*) was recorded at T9. Smooth newt (*Lissotriton vulgaris*), while not recorded during the site visits, are likely to occur within the site.

The Proposed Development will not result in a loss of any habitat for reptiles and amphibians. It is considered that suitable habitat is extremely widespread in the site and beyond.

6.6.1.5.5 *Fisheries and Aquatic Fauna*

The small streams that flow off the site of the Proposed Development, and downstream watercourses, were subject to biological evaluation and assessment through kick sampling. Full details of the results of these surveys are provided below. A map of the kick sample locations is provided in Figure 6-3.

The survey included a general habitat assessment and biological water quality assessment at watercourses within or downstream of the site. The water quality, as per Q-value (Quality Rating

System)[8], is fully described below. Two of the three sample locations assessed were Q4 'Good' and one as Q-3-4 'Moderate'.

The watercourses within and downstream of the site also have potential to support a range of fish species and aquatic inverts including salmonids, European eel, lamprey and white-clawed crayfish see Section 6.5.1.2.

Sample Station 1

Sample Station 1 is located downstream of the existing T13 road infrastructure in the Dunneill River just downstream of where an unnamed stream meets the Dunneill River west of the site. The watercourse is bordered by wet heath habitat. The river was fast flowing and included areas of both riffle and glide. The substrate comprised bedrock, boulder, cobble, gravel and fine gravel. No instream or emergent macrophytes were recorded at the sample point.

The Q rating assigned to the channel was Q4. It was assigned this value as Group A invertebrates were numerous, Group B, D and E invertebrates were absent and C invertebrates were dominant. The results of this kick sample are provided in Table 6-13 below.

Table 6-13: Invertebrate Sample Station 1 Results

Indicator Group	Taxon	Dominance
Group A - Very Pollution Sensitive	Ephemeroptera *(Ecdyonurus sp.)*	Fair numbers
	Plecoptera (*Isoperla*)	Common
Group B - Moderately Pollution Sensitive	None	None
Group C - Moderately Pollution Tolerant	Ephemeroptera (*Baetis rhodani*)	Common
	Diptera *(Chironimidae spp.)*	Numerous
	Tricoptera *(Hydropsyche)*	Common
Group D - Very Pollution Tolerant	None	None
Group E - Most Pollution Tolerant	None	None

[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.*

Plate 6-12: Sample Station 1 west of T13 on the Dunneill River (54.20249, -8.83978)

Sample Station 2

Sample Station 2 is located in the Doonbeakin Stream downstream of T2 along the north of the site. The watercourse is bordered by conifer plantation to the west and gorse scrub and recently felled woodland to the east. The river had a medium flow. The substrate comprised bedrock, boulder and cobble. No instream or emergent macrophytes were recorded at the sample point.

The Q rating assigned to the channel was Q3-4. It was assigned this value as Group A invertebrates were numerous, Group D invertebrates are common, Group B and E invertebrates were absent and Group C invertebrates were excessive. The results of this kick sample are provided in Table 6-14 below.

Table 6-14: Invertebrate Sample Station 2 Results

Indicator Group	Taxon	Dominance
Group A - Very Pollution Sensitive	Ephemeroptera *(Ecdyonurus sp.)*	Numerous
Group B - Moderately Pollution Sensitive	None	None
Group C - Moderately Pollution Tolerant	Crustacea (*Gammarus sp.)*	Numerous
Group D - Very Pollution Tolerant	Hirudinea *(Erpobdella)*	Common
Group E - Most Pollution Tolerant	None	None

Plate 6-13: Sample Station 2 Downstream of T2

Sample Station 3

Sample Station 3 is located in the Dunneill River upstream of Dunneill wind farm, completely outside the site. The watercourse is bordered by heath an bog habitat. The river was fast flowing and included areas of both riffle and glide. The substrate comprised bedrock, boulder, cobble, gravel and fine gravel. No instream or emergent macrophytes were recorded at the sample point.

The Q rating assigned to the channel was Q4. It was assigned this value as Group A invertebrates were-excessive, Group B, D and E invertebrates were absent and Group C invertebrates were common. The results of this kick sample are provided in Table 6-15.

Table 6-15: Invertebrate Sample Station 3 Results

Indicator Group	Taxon	Dominance
Group A - Very Pollution Sensitive	Ephemeroptera *(Ecdyonurus sp.)*	Present
	Plecoptera (*Chloropidae*)	Excessive
Group B - Moderately Pollution Sensitive	None	None
Group C - Moderately Pollution Tolerant	Trichoptera (*Rhyacophila sp.*)	Common
Group D - Very Pollution Tolerant	None	None
Group E - Most Pollution Tolerant	None	None

Plate 6-14: Sample Station 3 upstream of the Dunneill windfarm on the Dunneill River (54.20137, -8.81598)

6.6.1.5.6 Other species

No evidence of other protected taxa including invertebrates or amphibians, species listed in Annex II or IV of the EU Habitats Directive, or other species of conservation concern was identified within the boundaries of the Proposed Development site. The Proposed Development will not result in a loss of any habitat for any species.

No species listed as a Special Conservation Interest species of any nearby SPA were recorded during the site visit. No significant foraging or roosting habitat for the listed SCI bird species was recorded within or adjacent of the proposed development site boundary. A range of detailed field surveys focusing solely on bird species were undertaken. These are discussed in detail in Chapter 7 Ornithology.

6.6.2 Importance of Ecological Receptors

Table 6-16 lists all identified receptors and assigns them an ecological importance in accordance with the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009). This table also provides the rationale for this determination and identifies the habitats that are Key Ecological Receptors. These ecological receptors are considered in Section 6.7 of this report and mitigation/ measures will be incorporated into the Proposed Development where required, to avoid potential significant impacts on the features.

Table 6-16: Key Ecological Receptors identified during the assessment

Ecological feature or species	Reason for inclusion as a KER	KER
Designated sites	**Nationally Designated Sites** The following Nationally designated sites have hydrological connectivity to the Proposed Development and have been identified as being within the likely Zone of Impact: - Dunneill River pNHA This designated site has been assessed as of National importance and is included as a KER as there is potential for indirect effects on these sites during the operational stage of the development via water pollution	Yes
	European Designated Sites The following Special Area of Conservation is identified as being within the Likely Zone of Impact and is assessed fully in the NIS that accompanies this application: - Ox Mountains Bogs SAC (002006) This site is assigned **International** importance and included as a KER as there is potential for indirect effects on the SAC via water pollution during the operational stage of the development.	Yes
Aquatic Habitats and Related Species	**Eroding/upland rivers (FW1)** Four natural watercourses are located within the site boundary. These watercourses include: - Dunneill River (Dunneill_010) - Doonbeakin Stream (Doonbeakin_010) - Fiddandoo Stream - Unnamed stream These watercourses have been assigned **Local importance (Higher Value)** as they are of high biodiversity value in a local context and connect to downstream waterbodies in the local area. They also provide a conduit upstream to Ox Mountains Bogs SAC which is of international importance. Taking a precautionary approach; potential for indirect effect on these watercourses via water pollution during the operational stage of the development has been identified. Eroding/upland rivers (FW1) have therefore been identified as a KER for further assessment.	Yes
	Aquatic and Fisheries Species The watercourses within and downstream of the site have potential to support a range of aquatic species of **Local importance (Higher value)** including European eel, Atlantic salmon and three-spined stickleback. Taking a precautionary approach a potential pathway for indirect effects on these aquatic receptors during the operational stage of the development was identified as a result of deterioration of supporting habitat resulting from potential run off of pollutants. Aquatic fauna are therefore included as a KER.	Yes
Drainage ditches (FW4)	There are a number of drainage ditches within the site that drain conifer woodland, agricultural grassland and heath habitats. The drainage ditches connect to the Doonbeakin Stream and Dunneill River. In the absence of mitigation, the operational and decommissioning phases of the Proposed	Yes

Ecological feature or species	Reason for inclusion as a KER	KER
	Development have the potential to result in indirect effects on the water quality within the drainage ditches and in turn the aquatic dependant receptors. It is therefore assigned an importance of **Local importance (Higher value)** and is included as a KER for further assessment.	
Peatland Habitats	**Dry heath (HH1), Wet heath (HH3), Upland blanket bog (PB2)** These habitats have been mapped in the small section of the Ox Mountains Bogs SAC that is located within the proposed development site. These habitats have been assigned **International Importance** and conform to the EU Habitats Directive Annex I listed habitats Northern Atlantic wet heaths with *Erica tetralix* [4010], European dry heaths [4030] and Blanket bogs(* if active bog([7130]. Taking a precautionary approach, in the absence of best practice and design, the operational phase of the Proposed Development has the potential to result in indirect effects on the receptor and it is included as a KER for further assessment.	Yes Yes Yes
Improved Agricultural Grassland (GA1)	These habitats, although some contain small areas of semi-natural habitat that are of some local importance for wildlife are common and widespread in the local and wider landscape. These habitats are assigned **local importance (lower value)** and are therefore not included as KERs.	No
Dry meadows and grassy verges (GS2)		No
Wet grassland (GS4)		No
Conifer plantation (WD4)		No
Scrub (WS1)		No
Earth banks (BL2)		No
Buildings and artificial surfaces (BL3)		No
Spoil and bare ground (ED2)		No
Recolonising bare ground (ED3)		No
Recently-felled woodland (WS5)		No
Geyer's whorl snail	The known site for this species within the Ox Mountains Bogs SAC is located within the small section of the SAC which lies within the proposed development site boundary. Taking a highly precautionary approach, there is potential for indirect impacts on this species via deterioration of supporting habitat result from pollution of water quality during the operational stage of the development. As	Yes

Ecological feature or species	Reason for inclusion as a KER	KER
	this species is a Qualifying Interest of the SAC it has been assigned **International importance.** Therefore, the species has been included as a KER.	
Badger	Although no badger setts or signs of badger were identified within the site, there is potential for a badger population of **local importance (higher value)** to utilise the area for commuting and foraging. The proposed development will involve the extension of the operational life of the existing Dunneill windfarm. There will be no construction works and the windfarm will continue to operate as it currently operates. There will be no loss of badger habitat or disturbance of badger as a result of the extension of the operational life of the windfarm and therefore badger is not included as a KER.	No
Otter	No records of otter were recorded within the site boundary. Based on no otter records within the site 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).** No evidence of a more ecologically important population was recorded during any of the site surveys undertaken. Taking a highly precautionary approach, there is potential for indirect impacts on this species via deterioration of supporting habitat result from pollution of water quality during the operational stage of the development. Therefore, the species has been included as a KER.	Yes
Bats	The habitats within and surrounding the Proposed Development site are likely to be utilised by a bat population of **Local Importance (higher value)**. All bat species in Ireland are protected under both national legislation – (Wildlife Act, 1976, as amended in 2019) and European legislation – (Habitats Directive (92/43/EEC). Bats are likely to forage and commute within the vicinity of the Proposed Development. Two potential bat roosting features were identified within or adjacent to the development footprint. The Proposed Development has the potential to result in direct and indirect effects on the receptor. Therefore, bats are included as a KER for further assessment.	Yes
Reptiles and Amphibians	It is considered that the Proposed Development will not result in a significant loss of suitable habitat for reptiles and amphibians. No evidence of populations of amphibians being significant at more than a local level was recorded. No likely significant effects on these species are anticipated and therefore further survey/ assessment was not deemed necessary. Based on the low number of amphibian records for the site and the highly afforested nature of parts of the site, amphibians and reptiles have been assessed as of Local Importance (lower value).	No

6.7 Ecological Impact Assessment

6.7.1 Do-Nothing Scenario

The 'Do-Nothing' scenario entails the decommissioning of the existing wind farm under Condition 10 of the original planning application granted by Sligo County Council (Ref: PL 03619) once the current planning permission expires (2024) and restoration of the site to its original condition.

Condition 10 of the original Planning Permission to Sligo County Council (Ref: PL 03619) states the following in relation to the decommissioning of the wind farm:

> *'Upon termination of the use of the wind farm, the mast and turbines shall be dismantled and removed from the site and the site shall be restored to its existing condition in consultation with the planning authority. Prior to the commencement of development, the developer shall lodge with the planning authority, a cash deposit, a bond of an insurance company, or other security to secure the satisfactory reinstatement of the site on the cessation of the project. The amount of the security shall be 100,000 euro'.*

Should the Decommissioning Plan as set out in the Planning Conditions for Dunneill Wind Farm be implemented there is potential for direct habitat loss due to the potentially extensive ground works required to remove existing access tracks and the turbine foundations. There is also potential for run off of pollutants to watercourses and habitats identified as KERs. A more environmentally sensitive approach is outlined for the end of the proposed extended operational period (i.e., in 15 years), as set out in Section 6.7.4 below. The effect of decommissioning (as per the original planning application) is considered to have a long-term, moderate negative impact in the context of this EIAR.

6.7.2 Construction Phase

As described in Chapter 4 of the EIAR, no construction activities or alterations to the existing wind farm beyond routine maintenance activities are proposed as part of this application. Therefore, there will be no potential for impacts resulting from construction stage activities, including habitat loss, run-off of pollutants during construction activities and spread of invasive species and no further assessment is required.

6.7.3 Operational Phase

This section assesses the potential operational phase impacts associated with the Proposed Development. During the operational phase, the windfarm will continue to operate as it has done since it became operational in 2010. There will be no ground-disturbing works associated with the operational phase, no natural drainage features will be altered and there will be no direct or indirect discharges to natural watercourses during the continued operation of the wind farm.

Each turbine will be subject to a routine maintenance programme involving a number of checks and changing of consumables, including oil changes. In addition, there will be a requirement for unscheduled maintenance, which could vary between resetting alarms to major component changes requiring a crane. Typically, maintenance traffic will consist of four-wheel drive vehicles or vans. The electricity substation and site tracks will also require periodic maintenance. According to Chapter 4 of this EIAR, the operational wind farm does not require on-site storage of significant quantities of materials or liquids likely to cause a pollution incident, However, small quantities of hydrocarbons may be required from time to time in order to operate/maintain machinery.

Wastewater from the staff welfare facilities in the control buildings is managed by means of an existing 6,000 litre capacity holding tank, located approximately 5m southeast of the control building. As wastewater is not treated on-site, the Environmental Protection Agency's (EPA) 2009 *Code of Practice: Wastewater Treatment and Disposal Systems Serving Single Houses (p.e. 10)* does not apply. Nor does the EPA's 1999 manual *Treatment Systems for Small Communities, Business, Leisure Centres and Hotels* apply. The holding tank is inspected, maintained and emptied by a licensed waste contractor at regular intervals. The existing holding tank will continue to be maintained according to current best practice outlined above.

Taking a highly precautionary approach, there is potential for accidental spillage of pollutants during the operational stage of the development including routine maintenance activities on the site.

An assessment of the potential impacts on designated sites, habitats and fauna as a result of an accidental spillage event during the operational phase of the development is presented in Sections 6.7.3.1, 6.7.3.2 and 6.7.3.3 below. A range of mitigation measures to ensure that there are no significant residual effects on biodiversity or designated sites as a result of the proposed development are also included in the sections below.

6.7.3.1 Effects on Designated Sites

Ox Mountains Bogs SAC was the only European site identified within the likely zone of impact.

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

The NIS has provided an assessment of all potential direct or indirect adverse effects on European Sites.

The findings presented in the NIS are that:

'*For the reasons set out in detail in this NIS, in the light of the best scientific knowledge in the field, all aspects of the proposed development which, by itself, or in combination with other plans or projects, which may affect the relevant European Sites have been considered.*

The NIS contains information which the competent authority, may consider in making its own complete, precise and definitive findings and conclusions and upon which it is capable of determining that all reasonable scientific doubt has been removed as to the effects of the proposed development on the integrity of the relevant Natura 2000 sites.

In conclusion, in the light of the conclusions of the assessment which it shall conduct on the implications for the European sites concerned, the competent authority is enabled to ascertain that the proposed development will not adversely affect the integrity of any of the European sites concerned'.

One nationally designated site was identified as being within the zone of influence and in included as a KER. This is the Dunneill River pNHA. The section of Dunneill River designated as part of this pNHA is located approximately 4.6km downstream from the site. Taking a precautionary approach, a potential pathway for indirect effects on the pNHA due to deterioration of surface and groundwater quality resulting from run-off of pollutants during the operational phase of the windfarm was identified.

The proposed development consists of the extension of the operational life of an existing windfarm. There will be no construction activities and no loss of additional habitat within the development boundary. Any routine maintenance works required to the turbines and/or substation as part of the extended operation of the wind farm will be minor in nature. A pollution event during the operational stage including during any routine maintenance activities is considered highly unlikely as all vehicles and plant are regularly maintained in good working condition. In addition a range of best practice measures to ensure that there are no significant impacts on habitats or water quality due to run off of pollutants during the operational stage are included in Table 6-17 below. There will be no significant effects on any designated site as a result of the extension of the operational life of the existing windfarm. Following mitigation outlined in Table 6-17 below there is no potential for any significant residual effect at any geographic scale as a result of the Proposed Development.

6.7.3.2 Effects on Habitats

The operation of the Proposed Development will not result in any additional land take or loss of any habitats and as such there is no potential for any significant effects in this regard.

Potential for impacts on aquatic and other sensitive habitats as well as on aquatic species identified as KERs during operation is assessed in detail in the tables below.

6.7.3.2.1 *Effects on Peatland Habitats*

Potential for effects on peatland habitats, including upland blanket bog, wet heath, dry heath, during operation is assessed in detail in Table 6-17 below.

Table 6-17 Assessment of Potential Impacts on Peatland Habitats

Description of Effect	Areas of upland blanket bog, wet heath and dry heath were recorded in the small section of the Ox Mountains SAC that is located within the proposed development site boundary. Although degraded, these habitats conform to the Annex I Habitats Northern Atlantic wet heaths with *Erica tetralix* [4010], European dry heaths [4030] and Blanket bogs(* if active bog([7130]. Taking a highly precautionary approach, there is potential for accidental spillage or leaks of pollutants during the operational phase, including routine maintenance activities, on the site and run-off of pollutants into these nearby peatland habitats causing degradation or deterioration of these habitats. Such pollution events are considered highly unlikely as all vehicles and plant are regularly maintained in good working condition.
Characterisation of unmitigated effect	Although such pollution events are considered highly unlikely as all vehicles and plant are regularly maintained in good condition, in the absence of best practice and regular maintenance, the potential impact on peatland habitats during the operational phase of the Proposed Development has been assessed as a short-term negative effect. The magnitude of this impact is assessed as slight.
Assessment of Significance prior to mitigation	Significant effects on peatland habitats 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 these habitats.
Mitigation	Whilst no significant effects on peatland habitats are anticipated during the operational phase of the Proposed Development, any potential for effects on these habitats associated with the operational phase drainage of the site has been fully mitigated through appropriate design and mitigation as fully described below: › All plant and machinery to be serviced before being mobilised to site; › No plant maintenance completed on-site, any broken-down plant removed from site to be fixed; › Refuelling completed in a controlled manner using drip trays at all times on impermeable surfaces; › Mobile bowsers, tanks and drums stored in secure, impermeable bunded storage areas a minimum of 50m from open water; › Only designated trained operators authorised to refuel plant on-site; › Procedures and contingency plans set up to deal with emergency accidents or spills; and, › Highest standards of site management maintained, and utmost care and vigilance followed to prevent accidental contamination or unnecessary disturbance to the site and surrounding environment during works.

Residual Effect following Mitigation	No potential for significant effect has been identified at any geographic scale as a result of the Proposed Development. The residual impact will be the same for any selected turbine that is within the range of dimensions for which planning permission is sought.

6.7.3.2.2 Effects on Water Quality (Rivers, Streams, groundwater and sensitive aquatic faunal species).

Table 6-18: Assessment of Potential Impacts on Rivers, Streams and Sensitive Aquatic Faunal Species

Description of Effect	**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, otter and other water dependent species including the groundwater dependent Geyer's whorl snail. 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.** Taking a highly precautionary approach, there is potential for accidental spillage or leaks of pollutants during the operational phase, including routine maintenance activities on the site, and therefore potential for run off of pollutants to watercourses and groundwater within and downstream of the site, potentially affecting water quality and supporting habitat quality for aquatic species. Such pollution events are considered highly unlikely as all vehicles and plant are regularly maintained in good working condition. These impacts on water quality are fully described in Chapter 9: '*Water*' of this EIAR and are described here in relation specifically to biodiversity.
Characterisation of unmitigated effect	Although such pollution events are considered highly unlikely as all vehicles and plant are regularly maintained in good condition, in the absence of best practice and regular maintenance, the potential impact on water quality during the operational phase of the Proposed Development has been assessed as a short-term negative effect. The magnitude of this impact is assessed as slight.
Assessment of Significance prior to mitigation	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.
Mitigation	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 below: - All plant and machinery to be serviced before being mobilised to site; - No plant maintenance completed on-site, any broken-down plant removed from site to be fixed; - Refuelling completed in a controlled manner using drip trays at all times on impermeable surfaces; - Mobile bowsers, tanks and drums stored in secure, impermeable bunded storage areas a minimum of 50m from open water; - Only designated trained operators authorised to refuel plant on-site; and - Procedures and contingency plans set up to deal with emergency accidents or spills.

Residual Effect following Mitigation	No potential for significant effect has been identified at any geographic scale as a result of the Proposed Development. The residual impact will be the same for any selected turbine that is within the range of dimensions for which planning permission is sought.

6.7.3.3 Effects on Fauna during Operation

6.7.3.3.1 *Loss or Degradation of Supporting Habitat*

The Proposed Development will not result in any loss of supporting habitat for protected fauna. As described previously in this EIAR, there will be no requirements for in stream works and no loss of riverine habitat and therefore no potential for significant displacement effects on otter. There are no construction works associated with the proposed development and no potential for loss of supporting habitat for Geyer's whorl snail.

Taking a precautionary approach there is potential for indirect effects on otter and other aquatic species such as salmonids, lamprey, white-clawed crayfish, European eel, Geyer's whorl snail and aquatic invertebrates due to accidental spillage or leaks of pollutants during the operational phase, including routine maintenance activities on the site. Such an event could create potential for run off of pollutants to watercourses and habitats within and downstream of the site, potentially affecting water and habitat quality and supporting habitat quality for these species.

The potential for deterioration of water quality and habitat degradation has been assessed in Section 6.7.3.2.1 and Section 6.7.3.2.2 above and is not repeated here.

Following mitigation outlined in the preceding sections there is no potential for any significant residual effect at any geographic scale as a result of the Proposed Development.

6.7.3.3.2 *Disturbance /Displacement*

There will be no significant increase in anthropogenic activity as a result of the proposed development. With the exception of bat species (which are considered in Section 6.7.3.3.3 below), no potential for disturbance/displacement of any other faunal species was identified.

While otter may utilise the watercourses within and in proximity to the Proposed Development for commuting and foraging, otters are likely to be accustomed to daytime activity in the area which occurs as a result of routine maintenance works. In addition, otters are crepuscular in nature and are unlikely to be adversely impacted by the proposed development. The NPWS Threat Response Plan for otter acknowledges that "Little evidence has come to light in recent studies to suggest that disturbance by recreation is a significant pressure." It also identifies that otter are known to travel significant distances from streams and lakes in search of new territory and feeding areas.

Channin P (2003)[9] 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). The report also describes successful breeding in towns, under ferry terminals and under the jetties of one of Europe's largest oil and gas terminals at Sullom Voe in North Scotland.

Irish Wildlife Manual No. 23 (National Otter Survey of Ireland 2004/2005) found no significant relationship between disturbance and otter occurrence. In addition, no significant difference in otter presence was found between sites with and without recreational activity. It also states, "the lowest percentage occurrence was found at the sites with the lowest recorded disturbance!"

[9] *Chanin P (2003). Ecology of the European Otter. Conserving Natura 2000 Rivers Ecology Series No. 10. English Nature, Peterborough.*

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).

Based on the above review of scientific literature potential for adverse effects on otter as a result of the operational and decommissioning phases of the proposed development can be excluded.

6.7.3.3.3 Assessment of Potential Effects on Bats during operation

High levels of bat activity were recorded throughout the Proposed Development site in 2021. The Proposed Development is for the extension of operation of an existing wind farm which has been in operation for 12 years. Although the surveys identified high levels of bat activity, it doesn't appear that the existing wind farm is affecting local bat populations.

Site-level collision risk for high collision risk bat species was typically *Medium,* with the exception of soprano pipistrelle which had a *High* risk level for autumn. Overall bat activity levels were typical of the nature of the site, which is predominantly grassland and key-holed conifer forestry with moderate to high levels of bat activity recorded during the static detector surveys as well as the walked transects undertaken.

However, following per detector Ecobat analysis, the detectors showed high median activity levels across at least one season. In addition, carcass searches revealed two bat fatalities, one common pipistrelle near T2 and one soprano pipistrelle near T3 in April and July 2021 respectively.

Taking a precautionary approach and given the potential for high collision risk was recorded at median activity levels at these detectors, an adaptive monitoring and mitigation strategy has been devised for the Proposed Development, in line with the case study example provided in Appendix 5 of the NatureScot (2021) guidance and based on the site-specific data.

To assess the effects of the Proposed Development on bat activity, at least 3 years of post-consent monitoring is proposed. Post-consent monitoring will include static detector surveys, walked survey transects and corpse searching to record any bat fatalities resulting from collision. The results of post consent monitoring shall be utilised to assess any potential changes in bat activity patterns and to monitor the implementation of the mitigation strategy. At the end of Year 1, and if a curtailment requirement is identified (i.e. significant bat fatalities encountered), a curtailment programme shall be devised around key activity periods and weather parameters.

NatureScot Guidelines recommend that all wind turbines (where practically possible) are subject to 'feathering' of turbine blades when wind speeds are below the cut-in speed of the existing turbine (4m/s) and there remains uncertainty of the risk posed to bats. This means that the turbine blades are pitched at 90 degrees or parallel to the wind to reduce their rotation speed to below two revolutions per minute while idling. This measure has been shown to significantly reduce bat fatalities (by up to 50%) in some studies (NatureScot, 2021).

In accordance with NatureScot and having consideration of NIEA Guidelines, blade feathering will be implemented as a standard across all proposed turbines when wind speeds are below the cut-in speed of the turbine.

There will be no changes in infrastructure, layout or landscape as part of the Proposed Development. No loss or damage to commuting or foraging habitats is anticipated. Given the extensive area of habitat that will remain undisturbed throughout the site, no significant effects with regard to loss of commuting and foraging habitat are anticipated. No bats were observed emerging from the structures or trees within the EIAR Site Boundary during any of the surveys. Additionally, all structures and trees will be retained, thus no loss or damage to roosts is anticipated. Consequently, there is no potential for significant effect with regard to the loss or disturbance of roosting habitat.

The Proposed Development is predominantly located within grassland/bog habitat and keyholed conifer forestry. There will be no net loss of linear landscape features for commuting and foraging bats and there will be no loss of any roosting site of ecological significance. The habitats on the site will remain suitable for bats. No significant displacement of individuals or populations is anticipated.

Following mitigation outlined above there is no potential for any significant residual effect at any geographic scale as a result of the Proposed Development.

6.7.4 Decommissioning Phase

The potential impacts associated with future decommissioning of the Proposed Development in circa 2039 will be similar to those associated with a typical wind farm construction but of a reduced magnitude, due to the reduced scale of the proposed decommissioning works, as outlined in Chapter 4, Section 4.8 of this report.

Condition 10 of the original Planning Application (Ref: PL 03619) is set out in Section 6.7.1 above.

It is considered that this Condition is not the preferred approach from an environmental perspective, for the Proposed Development. Upon decommissioning of the Proposed Development, the wind turbines will be disassembled in reverse order to how they were erected. All above-ground turbine components will be separated and removed off-site for reuse or recycling. The disassembly and removal of the turbines will not have an impact on the subsurface environment (soils and geology) at the site.

It is proposed to leave turbine foundations in place underground and to cover with earth and reseed as appropriate. It is also proposed, under the new decommissioning plan, that site roadways will be left in situ, as appropriate, to facilitate on-going agricultural and commercial forestry uses. Leaving the turbine foundations and existing access roads in-situ is considered a more environmentally prudent option, as it will avoid the requirement for extensive excavations that would be required if removing the turbine foundations.

The decommissioned turbine bases and hard standing areas will be covered with local topsoil and reseeded with a local native mix to encourage vegetation growth and reduce run-off and sedimentation.

It is proposed to leave underground cables in place where they are unlikely to be impacted by typical agricultural and forestry works. It is proposed that site roadways will be left in situ, as appropriate, to facilitate access for agricultural and commercial forestry lands. A decommissioning plan which will follow the approach set out here will be agreed with the local authority prior to decommissioning of the Proposed Development.

Following implementation of the mitigation measures prescribed below no significant residual effects are anticipated. Taking a precautionary approach there is potential for indirect impacts on the KERs identified in Section 6.7.3 above, due to accidental spillage of pollutants during the decommissioning phase of the proposed development. This could occur during any earthworks required for the removal of turbine foundations or from accidental spillage of hydrocarbons.

Mitigation Measures

Oil used in transformers (at the substation and within each turbine transformer) and any storage of oils or hydrocarbons within the control building compound could potentially leak during the decommissioning phase and impact on groundwater or surface water quality. The substation transformer is in a concrete bund capable of holding 110% of the stored oil volume, and all oil on site is stored in suitable bunds capable of holding 110% of the stored oil volume. Turbine transformers are located within the turbine hardstands, with dedicated concrete foundations, so any leaks would be contained within the turbine transformer units and hydrocarbons would not be able to permeate to ground. In addition:

- All plant and machinery to be serviced before being mobilised to site;
- No plant maintenance completed on-site, any broken-down plant removed from site to be fixed;

- Refuelling completed in a controlled manner using drip trays at all times;
- Mobile bowsers, tanks and drums stored in secure, impermeable bunded storage areas away from open water;
- Only designated trained operators authorised to refuel plant on-site;
- Procedures and contingency plans set up to deal with emergency accidents or spills; and,
- While no significant earthworks are anticipated for the new decommissiong plan, if earthworks are required during the decommissiong phase, silt fences will be placed downgradient of any such works. Fences will be embedded into the local soils to ensure all site water (should any arise) is captured and filtered.

Residual effects following mitigation

Following mitigation outlined above there is no potential for any significant residual effect at any geographic scale as a result of the Proposed Development.

6.8 Cumulative impacts

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.

6.8.1 Assessment of Plans

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

- Sligo County Development Plan 2017 -2023
- National Biodiversity Action Plan 2017-2021
- Northern and Western Regional Assembly – Regional Spatial and Economic Strategy 2020-2032

The review focused on policies and objectives that relate to designated sites for nature conservation, biodiversity and protected species. Policies and objectives relating to the conservation of peatlands and sustainable land use were also reviewed, particularly where the policies relate to the preservation of surface water quality. An overview of the search results with regard to plans is provided in Table 6.19.

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

Table 6-19: Assessment of Plans

Plans	Key Policies and Objectives directly related to European Sites and Biodiversity in the Zone of Influence	Assessment of Potential Impact on Biodiversity
Sligo County Development Plan 2017-2023	P-NH-1 Protect, sustainably manage and enhance the natural heritage, biodiversity, geological heritage, landscape and environment of County Sligo in recognition of its importance for nature conservation and biodiversity, and as a non-renewable resource, in association with all stakeholders.	The Development plan was comprehensively reviewed, with particular reference to Policies and Objectives that relate to the Natura 2000 network, biodiversity and other natural heritage interests. No potential for cumulative impacts when considered in conjunction with the current proposal were identified. Best practice preventative measures will be implemented to avoid any significant impacts on biodiversity. There will be no adverse effects on ecological receptors as a result of deterioration in water quality habitat loss, displacement or disturbance.
	P-NH-3 Protect and, where possible, enhance the plant and animal species and their habitats that have been identified under the EU Habitats Directive, EU Birds Directive, the Wildlife Act and the Flora Protection Order.	
	P-NH-4 Take full account of the precautionary principle where uncertainty exists regarding the potential impact of a proposed development on the natural heritage resource	
	P-DSNC-1 Protect and maintain the favourable conservation status and conservation value of all natural heritage sites designated or proposed for designation in accordance with European and national legislation and agreements. These include Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Natural Heritage Areas (NHAs), Ramsar Sites, Statutory Nature Reserves. In addition, the Council will identify, maintain and develop non-designated areas of high nature conservation value which serve as linkages or 'stepping stones' between protected sites in accordance with Article 10 of the Habitats Directive.	
	P-DSNC-2 Promote the maintenance and, as appropriate, achievement of 'favourable conservation status' of habitats and species in association with the NPWS.	
	P-DSNC-3 Carry out an appropriate level of assessment for all development plans, land-use plans and projects that the Council authorizes or proposes to undertake or adopt, to determine the potential for these plans or projects to impact on designated sites, proposed designated sites or associated ecological corridors and linkages in accordance with the Habitats Directive, All appropriate assessments shall be in compliance with the provisions of Part XAB of the Planning and Development Act 2000.	
	P-DSNC-4 Consider development within, or with the potential to affect, Natural Heritage Areas or proposed Natural Heritage Areas, where it is shown that such development, activities or works will not have significant negative impacts on such sites or features, or in circumstances where impacts can be appropriately mitigated.	
	O-DSNC-1 Identify and protect local areas of high nature conservation value and support the management of landscape features which are of major importance for wild fauna and flora in accordance with Article 10 of the Habitats Directive.	

Plans	Key Policies and Objectives directly related to European Sites and Biodiversity in the Zone of Influence	Assessment of Potential Impact on Biodiversity
	P-PPAS-1 Ensure that development does not have a significant adverse impact, incapable of satisfactory mitigation on plant, animal or bird species protected by law	
	P-PPAS-2 Consult with the National Parks and Wildlife Service (DAHG) and take account of any licensing requirements when undertaking, approving and authorising development which is likely to affect plant, animal or bird species protected by law.	
	P-PPAS-3 Provide guidance to developers and others in relation to species protected by law and their protection and management in the context of development.	
	P-NCODS-1 Minimise the impact of new development on habitats of natural value that are key features of the County's ecological network. Developments likely to have an adverse effect on recognised sites of local nature conservation importance will be required to demonstrate the impacts on the ecological value of the site and will not be approved unless it can be clearly demonstrated that there are reasons for the development that outweigh the need to safeguard the nature conservation value of the site.	
	P-NCODS-2 Ensure that development proposals, where relevant, improve the ecological coherence of the Natura 2000 network and encourage the retention and management of landscape features that are of major importance for wild fauna and flora as per Article 10 of the Habitats Directive.	
	P-NCODS-3 Ensure that proposals for development protect and enhance biodiversity, wherever possible, by minimising adverse impacts on existing habitats and by including mitigation and/or compensation measures, as appropriate, which ensure that biodiversity is enhanced.	
	P-NCODS-4 Apply the precautionary principle in relation to development proposals with potential to impact on County Biodiversity Sites or on local nature conservation interest by requiring an ecological impact assessment (EcIA) to ensure that any proposed development will not affect the integrity and conservation value of the site.	
	P-WET-1 Have regard to the County Sligo Wetlands Surveys 2008-2011 and subsequent wetland surveys that may be published during the lifetime of this Plan. Protect surveyed wetland sites that have been rated of A (International), B (National) and C+ (County) importance.	
	P-WET-2 Ensure that an ecological assessment at an appropriate level is undertaken in conjunction with proposals involving drainage or reclamation of wetland habitats.	

Plans	Key Policies and Objectives directly related to European Sites and Biodiversity in the Zone of Influence	Assessment of Potential Impact on Biodiversity
	P-WTH-1 Protect trees, woodlands and hedgerows from development that would impact adversely upon them. Promote new tree and woodland planting and the enhancement of existing hedgerows by seeking increased coverage, in conjunction with new development using native species of local provenance, where possible.	
	P-WTH-2 Discourage the felling of mature trees to facilitate development and, where appropriate make use of tree preservation orders to protect important trees and groups of trees which may be at risk or have an important amenity or historic value.	
	P-WTH-3 Require the planting of native broadleaved species, and species of local provenance, in new developments.	
	P-WTH-4 Promote the planting of native tree and shrub species by committing to using native species (of local provenance wherever possible) in its landscaping works and on County Council property.	
	P-INW-1 Protect rivers, streams and other water courses and their associated Core Riparian Zones (CRZs) from inappropriate development and maintain them in an open state, capable of providing suitable habitats for fauna and flora. Structures (e.g. bridges) crossing fisheries waters shall be clear-span and shall be designed and built in consultation with Inland Fisheries Ireland.	
	P- INW-2 Protect and enhance biodiversity richness by protecting rivers, stream corridors and valleys by reserving land along their banks for ecological corridors, maintaining them free from inappropriate development and discouraging culverting or realignment.	
	P- INW-3 Ensure that all proposed greenfield residential and commercial developments use sustainable drainage systems (SUDS) in accordance with best current practice, ensuring protection of the integrity of wetland sites in the adjoining area, including their hydrological regime.	
	P- INW-4 Ensure that floodplains and wetlands within the Plan area are retained for their biodiversity and flood protection value.	
	P- INW-5 Ensure that proposed developments do not adversely affect groundwater resources and groundwater-dependent habitats and species.	
	O- INW-1 Consult with prescribed bodies prior to undertaking, approving or authorising any works or development that may impact on rivers, streams and watercourses.	
	O- INW-2 Require that runoff from a developed area does not result in deterioration of downstream watercourses or habitats, and that pollution generated by a development is treated within the development area prior to discharge to local watercourses.	
	P-INV-1 Prevent and control the spread of invasive plant and animal species within the county.	

Plans	Key Policies and Objectives directly related to European Sites and Biodiversity in the Zone of Influence	Assessment of Potential Impact on Biodiversity
	P-INV-2 Require, where appropriate, Invasive Species Management Plans to be prepared for development proposals regulated by the Planning Authority or undertaken by the Local Authority, and in particular for Japanese Knotweed and Giant Hogweed.	
National Biodiversity Action Plan 2017-2021	Target 6.2 - Sufficiency, coherence, connectivity and resilience of the protected areas network substantially enhanced by 2020.	There will be no adverse effects designated sites or biodiversity as a result of the Proposed Development. 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.
Northern and Western Regional Assembly – Regional Spatial and Economic Strategy 2020-2032	Regional Policy Objective 5.5 – Ensure efficient and sustainable use of all our natural resources, including inland waterways, peatlands, and forests in a manner which ensures a healthy society a clean environment and there is no net contribution to biodiversity loss arising from development supported in this strategy. Conserve and protect designated areas and natural heritage area. Conserve and protect European sites and their integrity. Regional Policy Objective 5.7 - Ensure that all plans, projects and activities requiring consent arising from the RSES are subject to the relevant environmental assessment requirements including SEA, EIA and AA as appropriate	The guidance document was comprehensively reviewed, with particular reference to policies and objectives that relate to the biodiversity, protected species and designated sites. A comprehensive Natura Impact Statement has been submitted along with this application. No potential for negative cumulative impacts when considered in conjunction with the current proposal were identified.

6.8.2 Assessment of Projects

As described in Section 2.5.1 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 with further detail provided below. In addition, Section 6.8.4 concludes on their potential for impact on biodiversity.

Other smaller developments within the wider site, as fully described in Table 2.1 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 applications within a 20-kilometre radius of the Proposed Development area were considered in further detail in below. Wind farms occurring at greater distances were considered, however, given the nature of the KERs identified within the site and that no significant residual effects were identified, further detailed analysis is not provided below:

Table 6-20: Wind energy applications within 20km of the development site

Pl.Ref	Description	Decision and Operational status
Kingsmountain Wind Farm		
97/469	The erection of a wind farm including 10 wind turbines (1.5mw/each) with 3.75m wide access road and electrical sub-station on revised site	Granted by Sligo CC 11/05/1999. Fully constructed and operational.
02/846	Alterations to previously permitted development under PL 97/469 involving an amendment to Condition No. 1(c) of this permission to locate transformers external to the 10 no. permitted turbines	Granted by Sligo CC 14/02/2003
Black Lough Wind Farm		
11/379	Ten year planning permission for the erection of an electricity generating windfarm consisting of four (4) wind turbines of hub height up to 65m and rotor diameter up to 71m, hardstandings, Electrical Control Building, 4 car park spaces, associated site roads, drainage and site works. The planning application is accompanied by an Environmental Impact Statement (EIS) and Natura Impact Statement (NIS)	Granted by Sligo CC. Granted by An Bord Pleanála (ABP Pl. Ref. PL21A.241637) 10/09/2013.
16/422	Development of a grid connection from the permitted windfarm at Tawnamore, Co. Sligo (Ref: PL 21.241637) to the Sligo/Mayo county boundary on County Road L-2604-39. The development will consist of a 20kv grid connection cable extending to circa 10.4 kilometres as described below and an electricity control room in the townland of Cloonkeelaun, Co. Sligo. The grid cable will consist of a circa 2.52 kilometre section of overhead line on six-metre high wooden poles in the townlands of Cloonkeelaun, Tawnalaughta and Carns, Co. Sligo and traverse underground for circa 7.89 kilometres through the townlands of Tawnamore, Caltragh, Tawnalaghta, Cloonkeelaun and Carns, Co. Sligo. The development will also consist of underground connections, 485 metres long, from two wind turbines proposed under planning reference PL 15/466 to the electricity control room in the townland of Cloonkeelaun, Co. Sligo. A concurrent planning application will be submitted to Mayo County Council for an underground grid connection from the Sligo/Mayo county boundary to the Glenree ESB substation, Bonniconlon, Co. Mayo.	Granted by Sligo CC 11/08/2017.

Pl.Ref	Description	Decision and Operational status
16822	Development of a 20kv underground grid connection cable extending to circa 6.43km to serve a permitted wind farm at Tawnamore, Co. Sligo (Ref No. PL21.241637). The underground cable will be developed from the Mayo/Sligo County Boundary at Carrowleagh to the Glencree ESB Substation Bonnyconlon and traverse the townlands of Carrowleagh, Carrownaglogh, Drumsheen and Bonnyconlon East.	Granted by Mayo CC 28/08/2017.
17/93	A ten year permission for development consisting of: (a) erection of four wind turbines with blade tip height of 124.33m (78.33m hub height, 92m rotor diameter) (b) cranage and assembly hardstand areas adjacent to each turbine (c) control room and parking spaces (d) cabling between each turbine (e) widening of existing access road and provision of new sections of access road to serve wind turbines (f) stilling ponds (g) peat reinstatement areas (h) replacement bridge across Gowlan River and realignment of approaches to the bridge (i) use of existing borrow pit and (j) all associated ancillary infrastructure. An Environmental Impact Statement (EIS) and a Natura Impact Statement (NIS) have been submitted with the application.	Granted by Sligo CC 03/06/2017. Fully constructed and operational.
19160	For development consisting of an amendment to the permitted grid connection (Ref. No. PL16/422). The amended grid connection will be from the Black Lough Wind Farm at Tawnamore, Co. Sligo (Ref. No. PL17/93 to the permitted control building at Cloonkeelaun (Ref. No. PL 16/422), traversing the townlands of Tawnamore and Cloonkeelaun. The development will consist of a 20kv cable extending to (a) circa 2.3 kilometres of overhead line supported by a single wooden poles, (b) approximately 240m of underground cabling extending from turbine T2 at Black Lough to the first wooden pole and (c) approximately 100m of underground cabling from the southern-most pole of the proposed overhead line to the control building at Cloonkeelaun. An Environmental Impact Assessment Report (EIAR) and a Natura Impact Statement (NIS) will be submitted to the planning authority	Granted by Sligo CC 20/12/2019
20228	For development consisting of amendment to planning permission PL17/93 for development of four wind turbines. The amendment application will consist of the removal of condition 7(c) of planning permission PL17/93, which provided for the removal of the crane hard standings following erection of the turbines.	Granted by Sligo CC 21/10/2020.
Cloonkeelaun Wind Farm		
10/235	Erection of up to 3 no. wind turbines with 64 metre hub heights, rotor diameter 71m, 4.5m access roads, upgrading of existing roads, hard standings and all associated infrastructure forming an extension to the permitted Carrowleagh Wind Farm. This application is accompanied by an Environmental Impact Statement (EIS)	Granted by Sligo CC 02/12/2010. Fully constructed and operational.
14/196	Development consisting of the variation of Condition 2 of Planning Permission PL 10/235 to amend the duration of the planning permission from 20 years from the date of the planning permission order to 25 years from the date of commissioning in December 2012	Granted by Sligo CC 14/09/2014.
Cloonkeelaun Single Turbine		
15/343	For development consisting of a ten-year planning permission for the construction of a wind turbine with a tip height of up to 124.33 metres, site access road, hard standing area, underground cabling and all ancillary site works (to the	Granted by Sligo CC 28/12/2015. Fully constructed and operational.

Pl.Ref	Description	Decision and Operational status
	northwest and adjacent to the existing Carrowleagh Wind Farm)	
Clonkeelaun Double Turbine		
15/466	Construction of two (2) wind turbines, each with a tip height of up to 124.33 metres, site access roads, hardstanding areas, underground cabling and all ancillary site works located (to the northwest and adjacent to the existing Carrowleagh Wind Farm) An EIS will be submitted with the application	Granted by Sligo CC 21/10/17. Fully constructed and operational.
Lackan Wind Farm		
02/816	Construction of 3 no. wind turbines, 60 metre hub height and 80 metre rotor diameter, access trackways, 4.5 metres in width, a substation building and associated site development works.	Granted by Sligo CC Granted by An Bord Pleanála (ABP Pl. Ref. 21.203388). Fully constructed and operational.
Carrowleagh Wind Farm		
03/2440	Construction of 15 No. Wind Turbines, 60 Metre Hub Height, and 66 Metre Rotor Diameter, Access Trackways 4.5 Metres in width, 1 38Kv Substation Building, a stone quarry of 0.1 Hectare and associated site development works.	Refused by Mayo CC Refused by An Bord Pleanála (ABP Pl. Ref. 16.206076).
06/3861	Construct a 29.9MW Wind Farm consisting of 13 No. Enercon E-70 2.3MW Turbines with an 64 Metre Hub Height, Rotor Diameter of 71 Metres, 4.5 Metre Access Roads to each turbine in addition to upgrade of existing roads hard standing at 20KV Substation building and temporary contractors compound.	Granted by Mayo CC 14/11/2007. Fully constructed and operational.
14/401	Variation of Condition 2 of Planning Permission P06/3861 to amend the duration of Planning Permission from 20 years from the date of commissioning to 25 years.	Granted by Mayo CC 28/10/2014
Bunnyconnellan Wind Farm		
10/514	27.6 Megawatt (MW) Wind Farm comprising 12 No. 2.3MW wind turbines, with steel towers and composite fibre rotor blades, of hub height up to 64 metres, a rotor diameter of up to 71 metres and base to blade tip height up to 99.55m. A substation control building with fenced compound containing electrical equipment, wind turbine transformers, turbine hardstands, new access tracks, strengthening and widening of existing turbury tracks on site, drainage works, new entrance with realignment improvements for site access from regional road no. 294 undergrounded electrical cables linking the turbines with substation, undergrounded communication cables, all further associated site works and related ancillary development	Granted by Mayo CC Granted by An Bord Pleanála with revised conditions (ABP Pl. Ref. PL16.241506) 13/12/2013. Fully constructed and operational.
Other Wind Farm Applications		
02/664	development of a wind farm comprising of 5 wind turbine generators, associated access roads and one meteorlogical tower.	Granted by Sligo CC 24/07/2003. Not constructed.
04/1010	Wind farm consisting of 3 no. turbines with 60m in hub height and rotor diameter of 52m, 4.5m access roads to each turbine, hard standings and substation building (Further Information has been submitted, Planning Ref. No. PL 04/1010 current application for a windfarm made by Aeropower Wind Energy Ltd in registered address Kilmacowen, Ballisodare, Co. Sligo	Granted by Sligo CC. Granted by An Bord Pleanála with revised conditions (ABP Pl. Ref.) 26/08/2005. Not constructed.
22161	development consisting of the construction of a wind turbine with an operational lifespan of 30 years, from commissioning, with a tip height of approximately 150 metres, site access road (approximately 330m), hardstand areas, underground cabling from the turbine to the existing Black Lough Wind	New Application to Sligo CC, decision due date 05/07/2022.

Pl.Ref	Description	Decision and Operational status
	Farm control building (in Cloonkeelaun) and all ancillary site works	

6.8.3 Existing Habitats and Land Uses

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

The Proposed Development is located in forestry and agricultural habitats, which generally provide low value habitats for faunal species. There is no potential for a cumulative loss of habitats as the wind farm is already constructed.

6.8.4 Assessment of Cumulative Effects

This section has been considered in combination with the existing grid connection for the current wind farm.

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

Following the detailed surveys undertaken and impact assessment provided in Section 6.7, it is concluded that there will be no significant residual habitat loss, disturbance, deterioration of water quality etc., associated with the Proposed Development and therefore it cannot contribute to any cumulative effect when considered in combination with other plans and projects. The other wind farms in the area were considered (among other projects) but the Proposed Development is already constructed therefore there is no potential for significant individual or cumulative negative effects on biodiversity from construction.

No significant effects as a result of the extended operation for 15 years 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 extended operation for 15 years of the Proposed Development will not result in any significant residual effects on biodiversity and will not contribute to any cumulative effect when considered in combination with other plans and projects.

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

6.9 Conclusion

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 Appropriate Assessment process. No potential for impacts on any nationally designated site was identified.

Provided that the proposed development is operated in accordance with the design, best practice 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.

APPENDIX 6-1

BAT REPORT

7. ORNITHOLOGY

7.1 Introduction

This chapter assesses the likely significant impacts of the proposed extension of operation of the existing Dunneill Wind Farm (hereafter the "Proposed Development") on avian receptors. Particular attention has been paid to bird species with national and international protection under the Irish Wildlife Acts 1976-2021 and the European Union (EU) Birds Directive (2009/147/EC). Where potential impacts on avian receptors are identified, mitigation is described, and the residual effects are assessed.

This chapter is supported by technical Appendices 7-1 to 7-4, which contain data from the ornithological surveys undertaken at the Proposed Development, including full details of the survey effort, weather conditions and bird records. Appendix 7-5 contains the results of monitoring for collisions of birds with turbines. Appendix 7-6 presents the bird monitoring plan.

The chapter is structured as follows:

- The Introduction provides a description of the Proposed Development and the relevant legislation, guidance and policy context.
- The Assessment Approach and Methodology section provides a comprehensive description of the ornithological surveys and impact assessment methodology used to inform a robust assessment of potential impacts of the Proposed Development on birds.
- The Baseline Ornithological Conditions section describes the existing bird population at the Proposed Development site.
- The Receptor Evaluation section identifies key ornithological receptors and determines their sensitivity.
- The Potential Impacts section details the impact assessment (including direct habitat loss, disturbance displacement and collision risk).
- The Mitigation and Best Practice Measures section describes proposed mitigation and best practice measures to ameliorate any identified impacts.
- The Monitoring section outlines a schedule for monitoring birds during each phase of the Proposed Development if planning permission is granted.
- The Residual Effects section considers the implications of any proposed mitigation, best practice and monitoring.
- Finally, the Cumulative Effects section fully assesses potential cumulative effects of the Proposed Development in combination with other projects.
- The Conclusion provides a summary statement on the overall significance of predicted effects on birds.

The following list defines the meaning of the technical terms used in this chapter:

- The EIAR boundary comprises the entire wind farm site and grid connection. This is referred to as the "Proposed Development" or the "Proposed Development site", where relevant.
- The "wind farm study area" or "study area" refers to all areas within the EIAR boundary except the grid connection.
- The infrastructural layout of the Proposed Development is referred to as the "Development Footprint".
- "Zone of Influence" (ZOI) for individual ornithological receptors refers to the zone within which potential effects are anticipated. ZOIs differ depending on the sensitivities of particular species and were assigned in accordance with best available guidance (SNH, 2016; McGuinness *et al.*, 2015), adopting a precautionary approach. The ZOI for the Proposed Development at Dunneill Wind Farm is less than or equal to 15km, given the sensitivities of the species encountered within the study area, following guidance provided by DEHLG (2010) and because the Screening Assessment of the Natura Impact Statement associated with Chapter 6 of this EIAR identified

no potential for significant effects on protected Natura 2000 sites located over 15km from the wind farm study area.

- "Key Ornithological Receptor" (KOR) is defined as a species occurring within the zone of influence of the development upon which potential impacts are anticipated and assessed.

7.1.1 Description of the Proposed Development

A full description of the Proposed Development is provided in Chapter 4 of this EIAR. In brief, the applicant is seeking planning permission to extend the operational period of the existing Dunneill Wind Farm for an additional 15 years. The existing wind farm consists of 13 No. Vestas V52 850-kilowatt (kW) turbines with a blade tip height of 75m (49m tower, 52m rotor diameter). The existing wind farm, which became operational in 2010, has a total rated capacity of c.11 Megawatts (MW).

7.1.2 Legislation, Guidance and Policy Context

This EIAR is prepared in accordance with the requirements of the EU EIA Directive (2011/92/ EU), as amended by Directive 2014/52/EU. The following key legislative provisions are applicable to habitats and fauna in Ireland:

- Irish Wildlife Acts 1976 to 2021. The original Act of 1976 (39/1976) was amended in 2000 (38/2000), 2010 (19/2010) and 2012 (29/2012), as well as in Part 3 of the Heritage Act 2018 (15/2018) and in Part 2 Chapter 3 of the Planning and Development, Heritage and Broadcasting (Amendment) Act 2021 (11/2021).
- The European Communities (Birds and Natural Habitats) Regulations 2011, as amended (S.I. no. 477 of 2011). These regulations transpose the EU Birds Directive into Irish law.
- The International Convention on Wetlands of International Importance (the Ramsar Convention), 1971. This convention protects 45 wetland sites of significant value for nature in Ireland.

In the absence of specific national ornithological survey guidance for Ireland, the following guidance documents published by NatureScot (formerly Scottish Natural Heritage [SNH]) have been followed to inform this assessment:

- SNH (2000). Wind farms and birds: calculating a theoretical collision risk assuming no avoidance action. Scottish Natural Heritage, Inverness, Scotland. Available at: https://www.nature.scot/sites/default/files/2017-09/Guidance%20Note%20-%20Windfarms%20and%20birds%20-%20Calculating%20a%20theoretical%20collision%20risk%20assuming%20no%20avoiding%20action.pdf
- SNH (2009). Monitoring the impact of onshore wind farms on birds. Scottish Natural Heritage, Inverness, Scotland. Available at: https://www.nature.scot/sites/default/files/2017-09/Guidance%20Note%20-%20Monitoring%20the%20impact%20of%20onshore%20windfarms%20on%20birds.pdf
- SNH (2016). Assessing connectivity with Special Protection Areas (SPAs). Scottish Natural Heritage, Inverness, Scotland. Available at: https://www.nature.scot/sites/default/files/2018-08/Assessing%20connectivity%20with%20special%20protection%20areas.pdf
- SNH (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms. Scottish Natural Heritage, Inverness, Scotland. Available at: https://www.nature.scot/sites/default/files/2018-06/Guidance%20Note%20-%20Recommended%20bird%20survey%20methods%20to%20inform%20impact%20assessment%20of%20onshore%20windfarms.pdf
- SNH (2018a) Avoidance rates for the onshore SNH wind farm collision risk model. Scottish Natural Heritage, Inverness, Scotland. Available at: https://www.nature.scot/sites/default/files/2018-09/Wind%20farm%20impacts%20on%20birds%20-

%20Use%20of%20Avoidance%20Rates%20in%20the%20SNH%20Wind%20Farm%20Collision%20Risk%20Model.pdf

- SNH (2018b). Assessing the cumulative impacts of onshore wind farms on birds. Scottish Natural Heritage, Inverness, Scotland. Available at: https://www.nature.scot/sites/default/files/2018-08/Guidance%20-%20Assessing%20the%20cumulative%20impacts%20of%20onshore%20wind%20farms%20on%20birds.pdf
- SNH (2018c). Assessing significance of impacts from onshore wind farms outwith designated areas. Scottish Natural Heritage, Inverness, Scotland. Available at: https://www.nature.scot/doc/guidance-assessing-significance-impacts-bird-populations-onshore-wind-farms-do-not-affect-protected

The following Irish guidance and reference documents were also consulted:

- Percival, S.M. (2003). Birds and wind farms in Ireland: A review of potential issues and impact assessment. Ecology Consulting, Durham, UK. Available at: https://tethys.pnnl.gov/sites/default/files/publications/Percival_2003.pdf
- McGuinness, D., Muldoon, C., Tierney, N., Cummins, S., Murray, A., Egan, S. and Crowe, O. (2015). Bird Sensitivity Mapping for Wind Energy Developments and Associated Infrastructure in the Republic of Ireland. Birdwatch Ireland, Wicklow, Ireland. Available at: https://birdwatchireland.ie/app/uploads/2019/09/BWI-Bird-Wind-Energy-devt-Sensitivity-Mapping-Guidance_document.pdf
- Gilbert, G., Stanbury, A. and Lewis, A. (2021). Birds of Conservation Concern in Ireland 4: 2020-2026. *Irish Birds,* 43:1-22. Available at: https://birdwatchireland.ie/birds-of-conservation-concern-in-ireland/

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

- European Commission (2002). Assessment of plans and projects significantly affecting Natura 2000 sites. Publications Office of the European Union, Luxembourg.
- European Commission (2020). Guidance document on wind energy developments and EU nature legislation. Publications Office of the European Union, Luxembourg.
- Planning and Development Acts 2000 – 2021 (30/ 2000 as amended).
- NRA (2009). Guidelines for Assessment of Ecological Impacts of National Road Schemes. National Roads Authority, Ireland.
- EPA (2022). Guidelines on the information to be contained in Environmental Impact Statement reports. Environmental Protection Agency, Johnstown Castle Estate, Wexford.
- DoHPLG (2018). Guidelines for planning authorities and An Bord Pleanála on carrying out Environmental Impact Assessment. Department of Housing, Planning and Local Government, Government of Ireland, Dublin.
- Development Planning Unit (2017). Sligo County Development Plan 2017-2023. Development Planning Unit, Sligo County Council, Sligo, Ireland.

7.1.3 Statement of Authority and Competence

This EIAR chapter has been prepared by Susan Doyle (Ph.D), Senior Ornithologist, and reviewed by Padraig Cregg (MSc.), Senior Ornithologist at MKO. Both are suitably qualified ornithologists with experience in completing avifaunal assessments and competent for the purposes of the preparation of this EIAR. Susan holds a BA in Natural Science (moderatorship in Zoology), an MSc. in Ecological Assessment and a Ph.D in ornithology. She has 6 years' postgraduate experience in avian research, conservation and monitoring, including 3 years' experience in ecological consultancy. Padraig holds a BSc. in Zoology and an MSc. in Evolutionary and Behaviour Ecology. He has over 9 years' experience in ecological consultancy, working in both the UK and Ireland in designing, executing and managing ornithological assessments.

The scope of works and survey methodology was devised by Padraig and is fully compliant with recent NatureScot guidance. Field surveys were undertaken by Andrew O'Donoghue (BSc.), Clodagh Helen (MSc.), Colin Delahunt (BSc.), Niall McHugh (BSc.) and Niamh Scanlon (BSc.), all of MKO. Collision monitoring was undertaken by Gavin O'Dowd (with dog Lara, who has been trained to find bird carcasses), and assessed by John Curtin (BSc.), all of Éire Ecology. All surveyors are suitably qualified for the purposes of providing data to inform this EIAR.

7.2 Assessment Approach and Methodology

7.2.1 Desk Study

A comprehensive desk study was undertaken to search for any relevant information on species of conservation concern that may use the study area. The assessment included a thorough review of the available ornithological data including:

- Designated sites within the likely ZOI of the Proposed Development
- Bird atlases
- Bird sensitivity mapping tool
- Online web-mappers from the National Biodiversity Data Centre
- Irish Wetland Bird Survey data
- Review of specially requested records from the National Parks and Wildlife Service Rare and Protected Species Database

7.2.2 Consultation

Consultation was undertaken with relevant statutory and non-statutory organisations as part of the EIAR scoping to inform the current assessment. Full details can be found in Chapter 2 of this EIAR. Table 7-1 provides a list of the organisations consulted with regard to ornithology during the scoping process and notes where scoping responses were received.

Copies of all scoping responses are included in Appendix 2-3 of this EIAR. The recommendations of the consultees have informed the EIAR preparation process and the contents of this chapter; Chapter 2 describes where the comments raised in the scoping responses received have been addressed.

Table 7-1 Consultation responses in relation to ornithology

Consultee	Response
BirdWatch Ireland	No response to date
Irish Red Grouse Association	No response to date
Irish Raptor Study Group	No response to date
Irish Wildlife Trust	Responded on 18 June 2021, with no comments in relation to birds.

7.2.3 Identification of Target Species and Key Ornithological Receptors

Following a comprehensive desk study, initial site visits and consultation, a list of "target species" likely to occur in the ZOI of the Proposed Development was compiled. Bird surveys conducted in the study area were then specifically designed to survey for these target species, in accordance with SNH (2017). The target species list was drawn from:

- Species listed on Annex I of the EU Birds Directive
- Special Conservation Interests (SCI) of Special Protection Areas (SPA) within the zone of likely significant effects
- Red listed Birds of Conservation Concern in Ireland (BoCCI)
- Species listed on Schedule 4 of the Wildlife Acts 1976-2021

Following analysis of field survey data (described below), a precautionary screening approach was followed to identify KORs: the list of target species observed during surveys (see Appendix 7-1) was refined to KORs, excluding those for which pathways for a significant effect could not be identified.

7.2.4 Field Surveys

Field surveys were undertaken during the survey period April 2021 – March 2022, consisting of one breeding season (April – September) and one non-breeding season (October – March). One year of survey data was considered adequate for the purposes of this impact assessment because Dunneill Wind Farm is operational, therefore likely to have reduced bird interests compared with a pre-development wind farm site. Please refer to Section 7.2.7.1 for further discussion.

Based on the results of the desk study, consultation and reconnaissance site visits described in the previous sections (Section 7.2.1-7.2.3), the assemblage of bird species in the study area and the likely importance of the study area for these species were ascertained. Then, adopting a precautionary approach, a site-specific scope for ornithological surveys was devised. The data provided in the field surveys is robust and allows clear, precise and definitive conclusions to be made on the avian receptors identified within the study area.

7.2.4.1 Survey Methodologies

The survey work that was undertaken between April 2021 and March 2022 forms the core dataset for the assessment of impacts on ornithology. In the absence of specific national bird survey guidelines, the ornithological surveys were designed and undertaken in full accordance with the guidance document 'Recommended bird survey methods to inform impact assessment of onshore wind farms' (SNH, 2017). The various ornithological surveys undertaken at the wind farm study area and hinterland are described in detail below.

7.2.4.1.1 *Vantage Point Surveys*

Vantage point surveys were undertaken in accordance with SNH (2017) from April 2021 to March 2022. These surveys aimed to monitor flight activity in the wind farm study area. Surveys were conducted monthly throughout this period from two fixed point vantage points with comprehensive coverage of the study area (Figure 7.2.1). The vantage point locations were selected by undertaking a viewshed analysis (described below) and confirmed by a recce visit and initial field surveys to ensure that the turbine layout was entirely covered.

Viewshed analysis was carried out to test the adequacy of the coverage of the study area provided by the chosen vantage point locations. Viewsheds were calculated using Resoft Wind Farm ZTV (Zone of Theoretical Visibility) software in combination with Mapinfo Professional (Version 10.0) using a notional layer suspended at 23m, which is representative of the minimum height considered for the Potential Collision Risk Area. Note that while the relevance of being able to view as much of the site to ground level is acknowledged, the NatureScot guidance emphasises the importance of visibility of the 'collision risk volume' when the data is to be used to estimate the risk of collision with turbines by birds.

The viewshed analysis aims to identify the most suitable locations to site vantage points such that the airspace of the turbine rotor swept area is in view, plus a 500m radius of the outermost turbines, in line with SNH (2017). The analysis aims to achieve this using the fewest possible number of vantage points. The vantage point locations were tested for visibility coverage by creating a viewshed point 1.75 meters in height (to represent the height of the observer) on a map using 10 metre contours terrain data. The relative height of any surrounding forestry and its effects on visibility was also accounted for in the analysis. Using the ZTV software, a viewshed of 360° was produced calculating an area 23m from ground level up to a 2km radius. The resulting viewshed image was then cropped to 180 degrees to give the survey viewshed. The visible viewshed generated by the software at 23m is presented in Figure 7.2.2. Note that these are theoretical predictions produced by the software, therefore must be interpreted in conjunction with ground-truthing at the true vantage point locations, as there is inevitable deviation between the theoretical predictions and true visible area due to the resolution of the contours. The reconnaissance visit to the wind farm study area confirmed that the lowest swept height of the existing turbines was visible from the vantage points presented in Figure 7.2.1

Data on bird observations and flight activity was collected from a scanning arc of 180° and a 2km radius by an observer at the fixed vantage point locations for two 3 hour watches separated by a minimum 30 minute break (ie. 6 hours total) per month. Surveys were scheduled to provide a spread over the full daylight period, including dawn and dusk watches to coincide with the highest peaks of bird activity. Along with target species, any additional (non-target) species observed were recorded to inform the evaluation of the supporting habitat. The survey effort is presented in Appendix 7-2, including full details of dates, times and weather conditions. Table 7-2 below provides a summary of the survey effort.

Table 7-2 Vantage point survey effort

Survey Season	Months	Effort per Vantage Point
Breeding Season 2021	April 2021-September 2021 (6 months)	36 hours
Winter Season 2021-22	October 2021 – March 2022 (6 months)	36 hours

Each flight observation was assigned a unique identifier when mapped in the field and digitised using QGIS software. Observed flight activity was recorded as per defined flight bands. Between April 2021 and September 2021, the bands for both vantage points were split into 0-15m, 15-23m, 23-75m, 75-150m and 150m+. All flight activity within a height band 23-75m is considered to be within the Potential Collision Height (PCH) with regard to the turbine swept area. Between October 2021 and March 2022, the bands for one vantage point (VP1) were split into 0-15m, 15-25m, 25-200m and 200m+ and all flight activity within a height band 25-200m is considered to be within the PCH.

7.2.4.1.2 Breeding Walkover Surveys

Breeding walkover surveys were undertaken to determine possible, probable or confirmed breeding bird activity within the wind farm study area and to a 500m radius. The methodology was based on Brown and Shepherd (1993) and Calladine *et al.* (2009), combined with Common Bird Census methods (British Trust for Ornithology, 2021) for dense habitat, as per SNH (2017) recommendations. Transect routes were walked across different habitat complexes where access allowed. Using binoculars, the surveyor regularly scanned the surroundings of each transect for target species. Breeding status was assigned following British Trust for Ornithology (BTO) breeding status codes (https://www.bto.org/our-science/projects/birdatlas/methods/breeding-evidence). Along with target species, all additional (non-target) species observed were recorded to inform the evaluation of the supporting habitat.

Breeding walkover surveys were conducted during daylight hours over four visits during the core breeding season months April to July 2021. The survey effort is presented in Appendix 7-2, including full details of dates, times and weather conditions for each survey. Figure 7-2-3 shows the transect routes.

7.2.4.1.3 Winter Walkover Surveys

Winter walkover surveys were undertaken to record the presence of bird species within the wind farm study area and to a 500m radius. The methodology was adapted from the breeding walkover surveys outlined above. Transect routes were walked across different habitat complexes within the study area where access allowed. Along with target species, all additional (non-target) species observed were recorded to inform the evaluation of supporting habitat.

Winter walkover surveys were conducted in daylight hours over four visits between October and March 2021/22. All target species observations were mapped. Survey effort is presented in Appendix 7-2, including full details of dates, times and weather conditions for each survey. Figure 7-2-4 shows the transect routes.

7.2.4.1.4 *Breeding Raptor Surveys*

Raptors include all harrier, falcon, buzzard, eagle, hawk, owl, kite and osprey species. Breeding raptor surveys were undertaken within the wind farm study area and to a 2km radius. Survey methodology followed Hardey *et al.* (2013), as per SNH (2017) recommendations. All raptor species were recorded during these surveys to identify occupied territories and monitor their breeding success at the study area. Breeding status was assigned following BTO breeding status codes.

Breeding raptor watches (supplemented by transects if necessary) were conducted during daylight over 18 hours per month during the core breeding season between April and July 2021. Survey effort is presented in Appendix 7-2, including full details of dates, times and weather conditions. Figure 7-2-5 shows the locations of 12 breeding raptor watch points and supplementary transects.

7.2.4.1.5 *Breeding Red Grouse Surveys*

Breeding red grouse surveys were undertaken within the wind farm study area and to a 500m radius. Survey methodology followed Cummins *et al.* (2010a): the surveyor walked transects 150m apart through suitable bog and heath habitat, where access allowed, stopping every 100m to broadcast red grouse lure calls for 30 seconds and listening for responses. Call-back and flying in response to the lure were recorded. The survey was conducted in mid-March 2022 and all surveys were conducted under National Parks and Wildlife Service license. Survey effort is presented in Appendix 7-2, including full details of dates, times and weather conditions. Figure 7-2-6 shows the transect routes.

7.2.4.1.6 *Hen Harrier Winter Roost Surveys*

Hen harrier roost surveys were undertaken within the wind farm study area and to a 2km radius. Survey methodology followed SNH (2017) and Gilbert *et al.* (1998) recommendations. These surveys aimed to identify active winter hen harrier roosts within the study area. Roost watches of 2-3 hours were conducted at four hen harrier vantage point locations from dusk until last visible light during which all hen harrier observations were mapped. Each hen harrier vantage point was surveyed once per month during the winter season between October and March 2021/22. Survey effort is presented in Appendix 7-2, including full details of dates, times and weather conditions. Figure 7-2-7 shows the hen harrier vantage point locations.

7.2.4.1.7 *Waterbird Distribution Surveys*

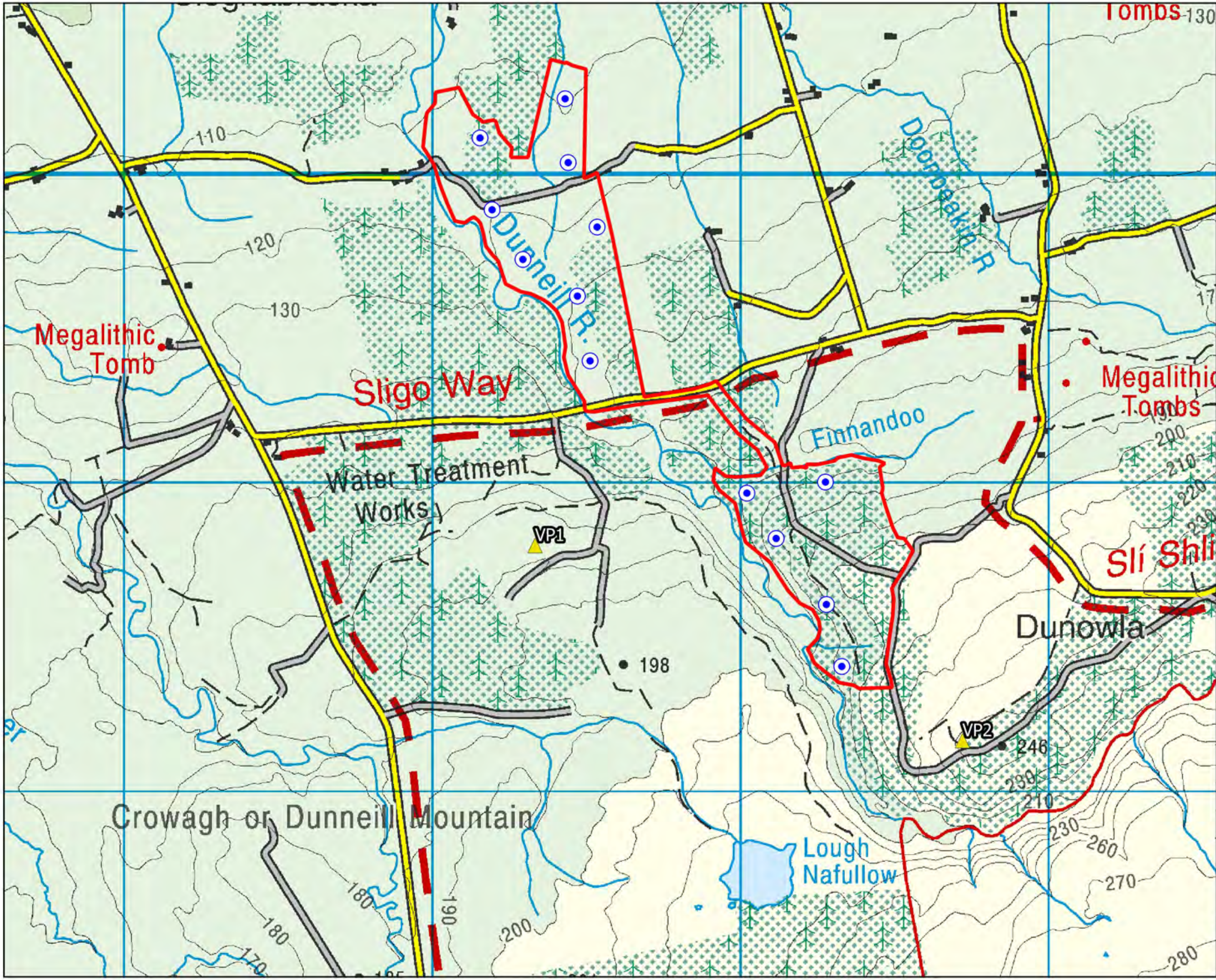
Waterbirds include: swans, geese and ducks; cormorant, shag, divers and grebes; auks and seabirds; gulls, terns and skuas; herons, egrets and crane; rails and crakes; waders; and kingfisher. Significant wetlands, waterbodies and coastline within 8km of the wind farm study area were surveyed for waterbirds during the 2021/2022 winter and passage season (August to May inclusive). The area surveyed exceeds the 500m for foraging waterbirds and 1km for roosting waterbirds required by SNH (2017) and follows the recommendations of SNH (2016).

Survey methodology followed Gilbert *et al.* (1998) and the Irish Wetland Bird Survey (BirdWatch Ireland, 2021), as recommended by SNH (2017). Surveys were undertaken during daylight hours from suitable vantage points at wetlands and waterbodies. Target waterbird species observed were mapped. Survey effort, including details of survey duration and weather conditions, is presented in Appendix 7-2. Figure 7-2-8 shows the surveyed area.

7.2.5 Collision Monitoring

Collision monitoring was conducted at the wind farm to estimate the number of individual birds killed by collision with moving wind turbine rotor blades. All 13 turbines were surveyed once per month from April 2021 to March 2022 following a standardised dog-led carcass search methodology. A 120 X 120m plot centred on the turbine bases were searched for an average of 65 minutes per month and all bird carcasses detected within were recorded. If the cause of death was not apparent, the fatality was conservatively attributed to collision with turbine blades.

To ensure a more accurate estimation of the total number of fatalities, dog-lead searches were calibrated to account for the dog's ability to find bird carcasses (searcher efficiency) and the likelihood of scavenging of carcasses by animals (scavenger removal). The searcher efficiency trial was conducted by planting carcasses within the site and allowing the dog to search for them. One worker left carcasses in a trial plot, and the dog and trainer team searched the following day. This gap aided in hiding any scent of the worker laying the carcasses and allowed time for scavenging to occur. At Dunneill, ten bird and bat carcasses were planted within various habitats and searched for by the dog. Searcher efficiency was then based on the percentage retrieval success. The scavenger removel trial was conducted on eight occasions by leaving carcasses in trial plots for 30 days or until scavengers removed the carcass. A determination on carcass removal was made when no body parts containing flesh or bone or >10 disarticulated feathers could be found (remaining carcass material was retrieved at the end of the trial). The scavenger removal rate was then determined by the amount of scavenging that occurred in the intervening period. Full survey methodology, including survey effort, is provided in Appendix 7-5.



Map Legend

Site Boundary

Turbine Locations

Vantage Point Locations

Study Area Boundary

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Project Title: Dunneill Wind Farm	
Drawn By: SD	Checked By: PC
Project No.: 210207	Drawing No.: Fig 7.2.1
Scale: 1:16000	Date: 01.04.21

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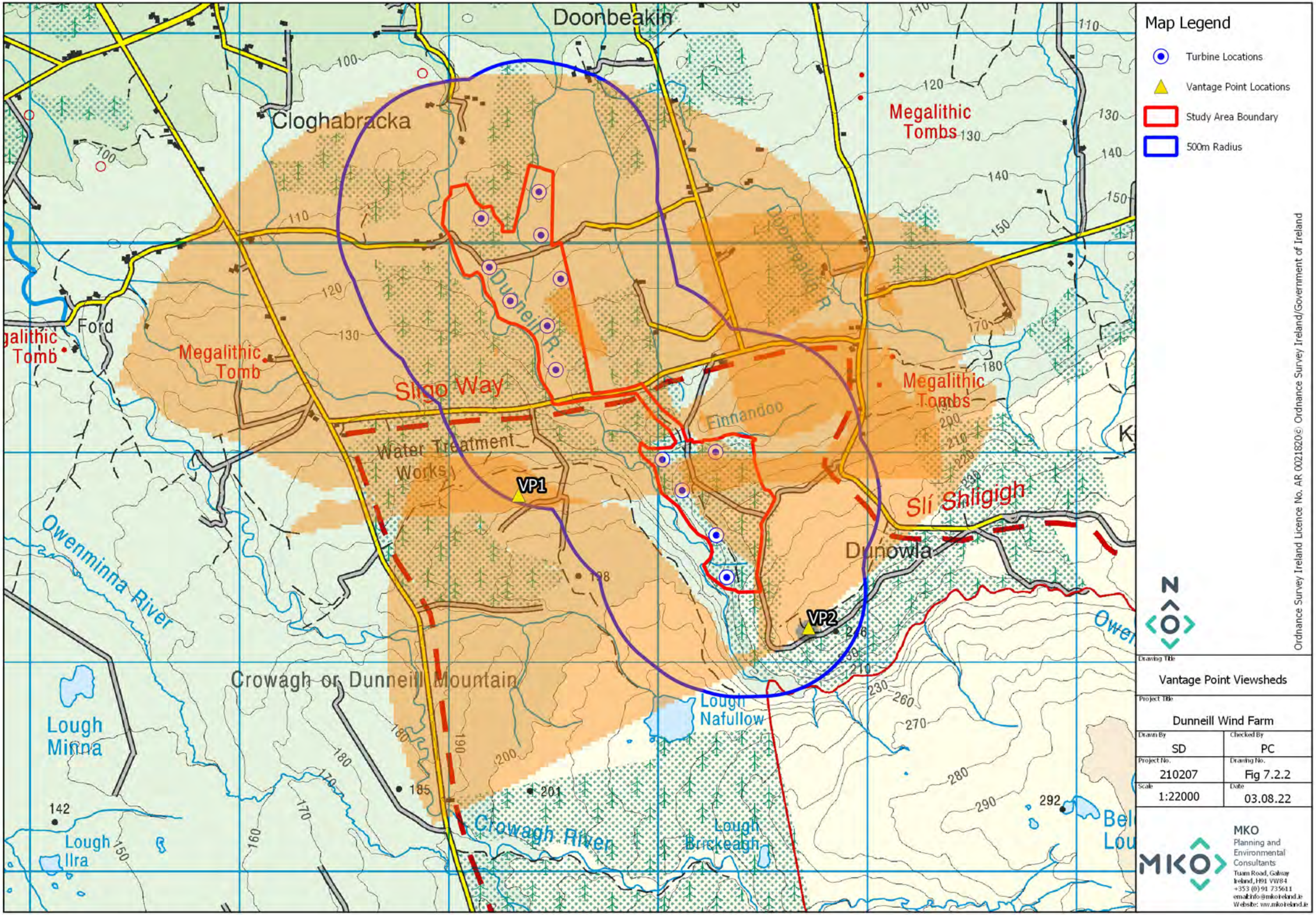
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Cloghabracka
Megalithic Tombs
Megalithic Tomb
Ford
Sligo Way
Dunneill R.
Doonaveeragh R.
Finnandoo
Water Treatment Works
VP1
VP2
Slí Shligigh
Dunowla
Owenmiinna River
Crowagh or Dunneill Mountain
Lough Minna
Lough Nafullow
Lough Ilra
Crowagh River
Lough Brickeagh
Map Legend
Turbine Locations
Vantage Point Locations
Study Area Boundary
500m Radius
Ordnance Survey Ireland Licence No. AR 0021820© Ordnance Survey Ireland/Government of Ireland
Drawing Title
Vantage Point Viewsheds
Project Title
Dunneill Wind Farm
Drawn By
SD
Checked By
PC
Project No.
210207
Drawing No.
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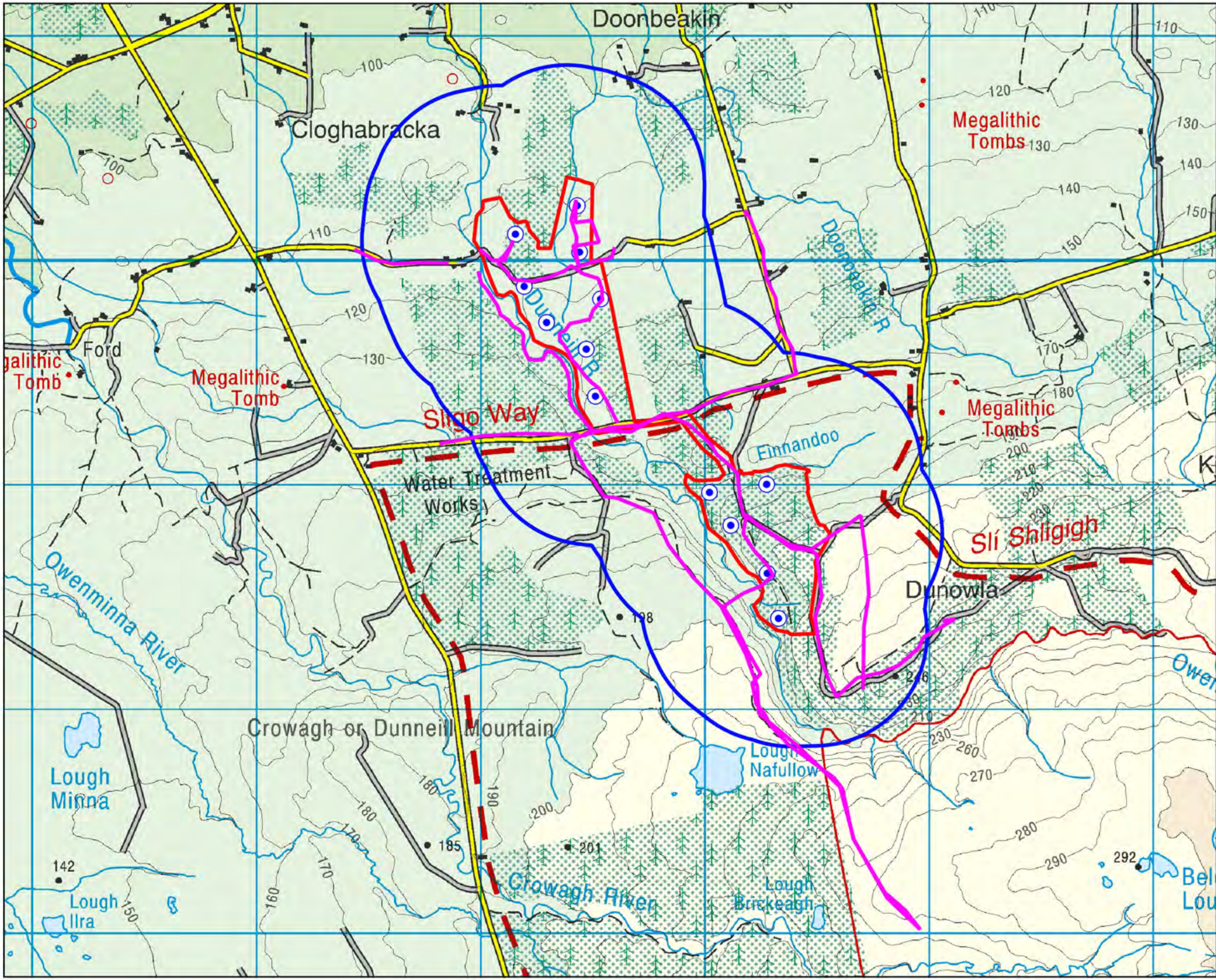

Map Legend

500m Radius

Breeding Walkover Transects

Turbine Locations

Study Area Boundary

500m Radius of Study Area

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Drawing Title	
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Project Title	
Dunneill Wind Farm	
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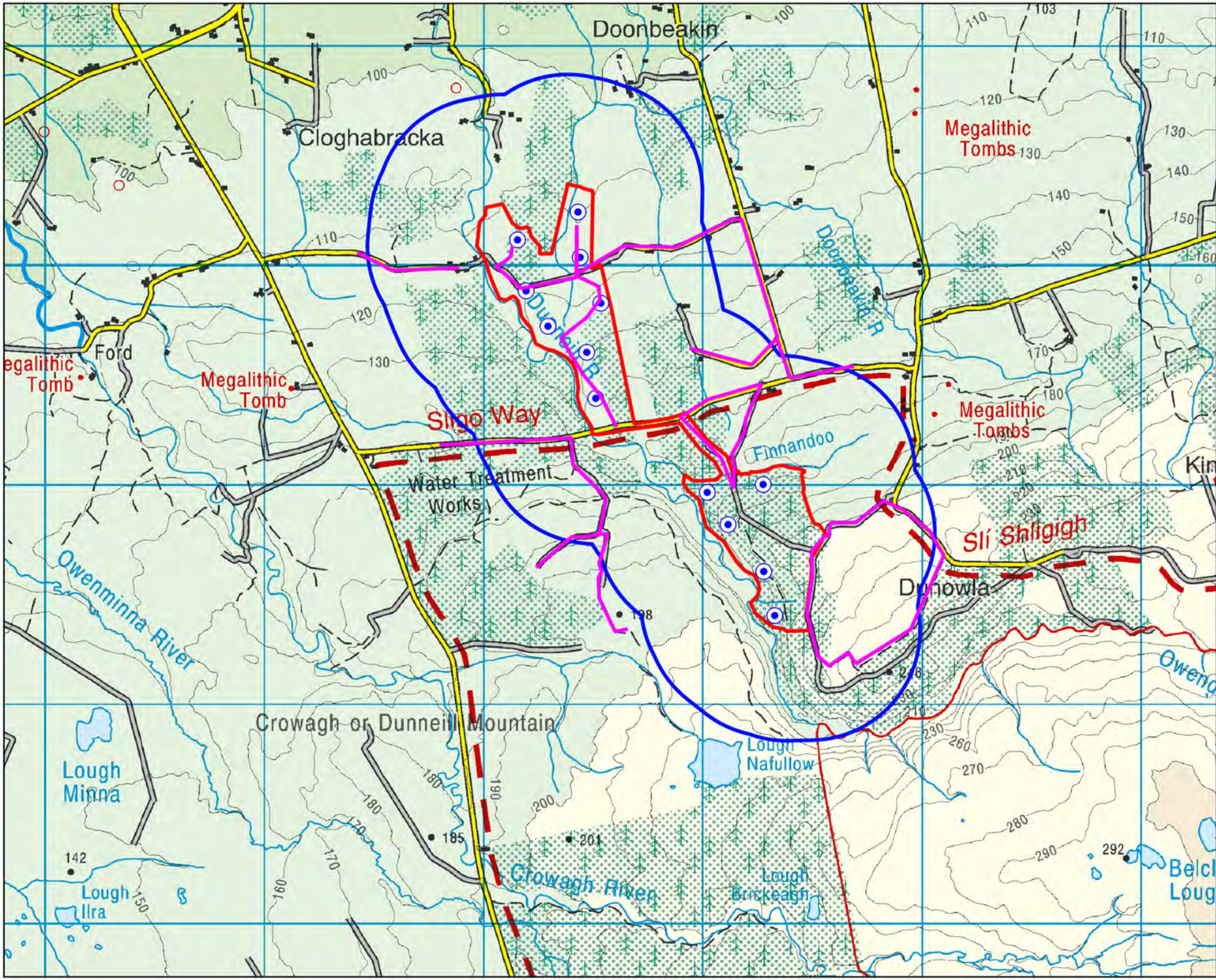

Map Legend

500m Radius

- Turbine Locations
- Winter Walkover Transects
- Study Area Boundary
- 500m Radius of Study Area

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Drawing Title	
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Project Title	
Dunneill Wind Farm	
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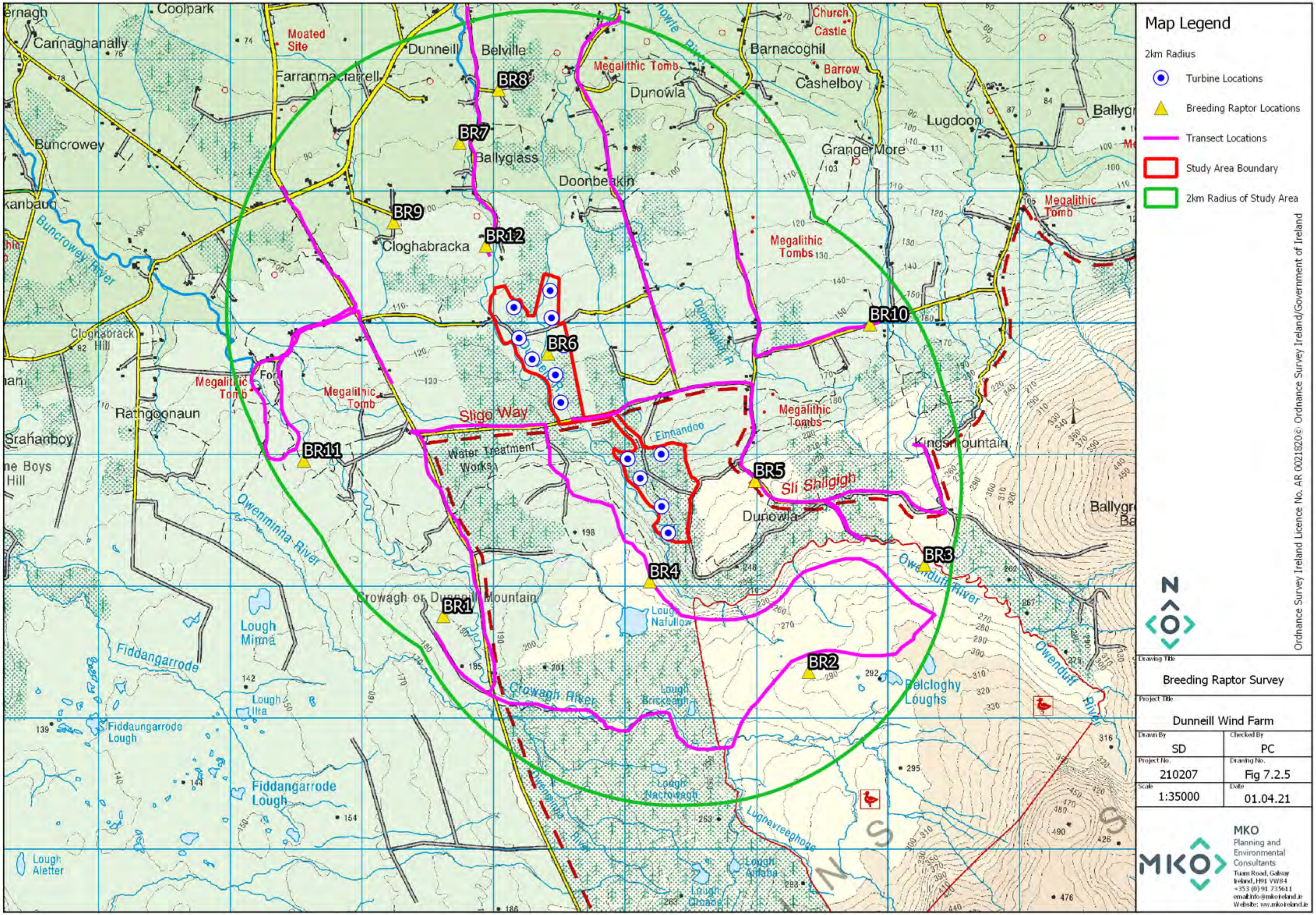
Map Legend
2km Radius
Turbine Locations
Breeding Raptor Locations
Transect Locations
Study Area Boundary
2km Radius of Study Area
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Breeding Raptor Survey
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BR1
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BR9
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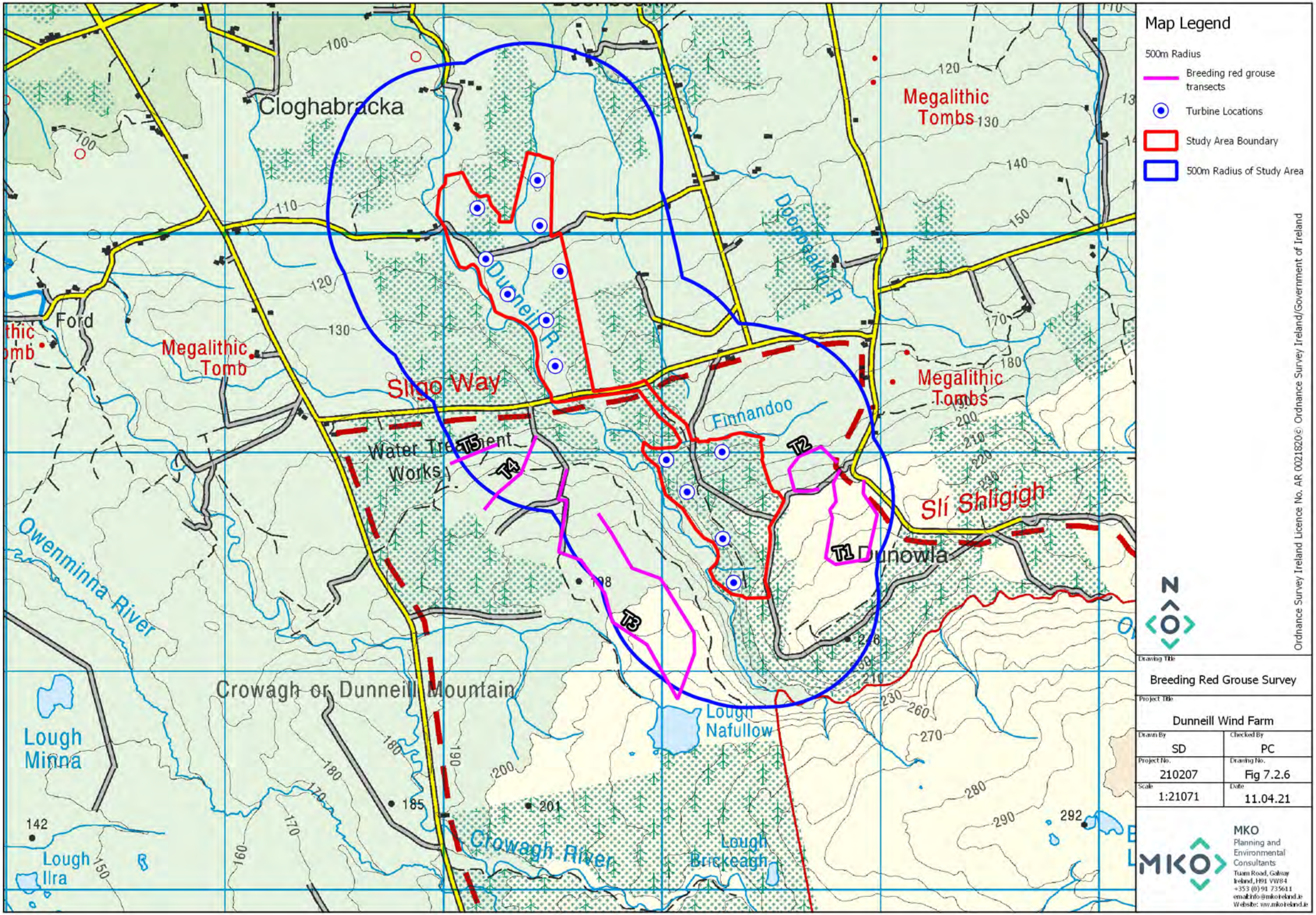
BR11
BR12
Coolpark
Carnaghanally
Moated Site
Dunneill
Belville
Farranmaccarrell
Church Castle
Barnacoghil
Barrow
Cashelboy
Megalithic Tomb
Dunowla
Lugdoon
Buncrowey
Ballyglass
Doonbeakin
Granger More
Cloghabracka
Megalithic Tombs
Buncrowey River
Cloghabrack Hill
Rathgoonaun
Strahanboy
Sligo Way
Water Treatment Works
Einnandoo
Kingsmountain
Slí Shligigh
Owenminna River
Crowagh or Dunneill Mountain
Owenduff River
Lough Nafullow
Lough Minna
Fiddangarrode
Lough Ultra
Crowagh River
Lough Brickeagh
Belclogby Loughs
Fiddaungarrode Lough
Fiddangarrode Lough
Lough Nacrowagh
Lough Aletter
Lough Aillaba
Lugnavreeghoge



Map Legend
500m Radius
Breeding red grouse transects
Turbine Locations
Study Area Boundary
500m Radius of Study Area
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Project Title
Dunneill Wind Farm
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Checked By
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Project No.
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Cloghabracka
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Megalithic Tomb
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Dunneill R.
Doonaakin R
Finnandoo
Water Treatment Works
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T2
T3
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T5
Slí Shligigh
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Crowagh or Dunneill Mountain
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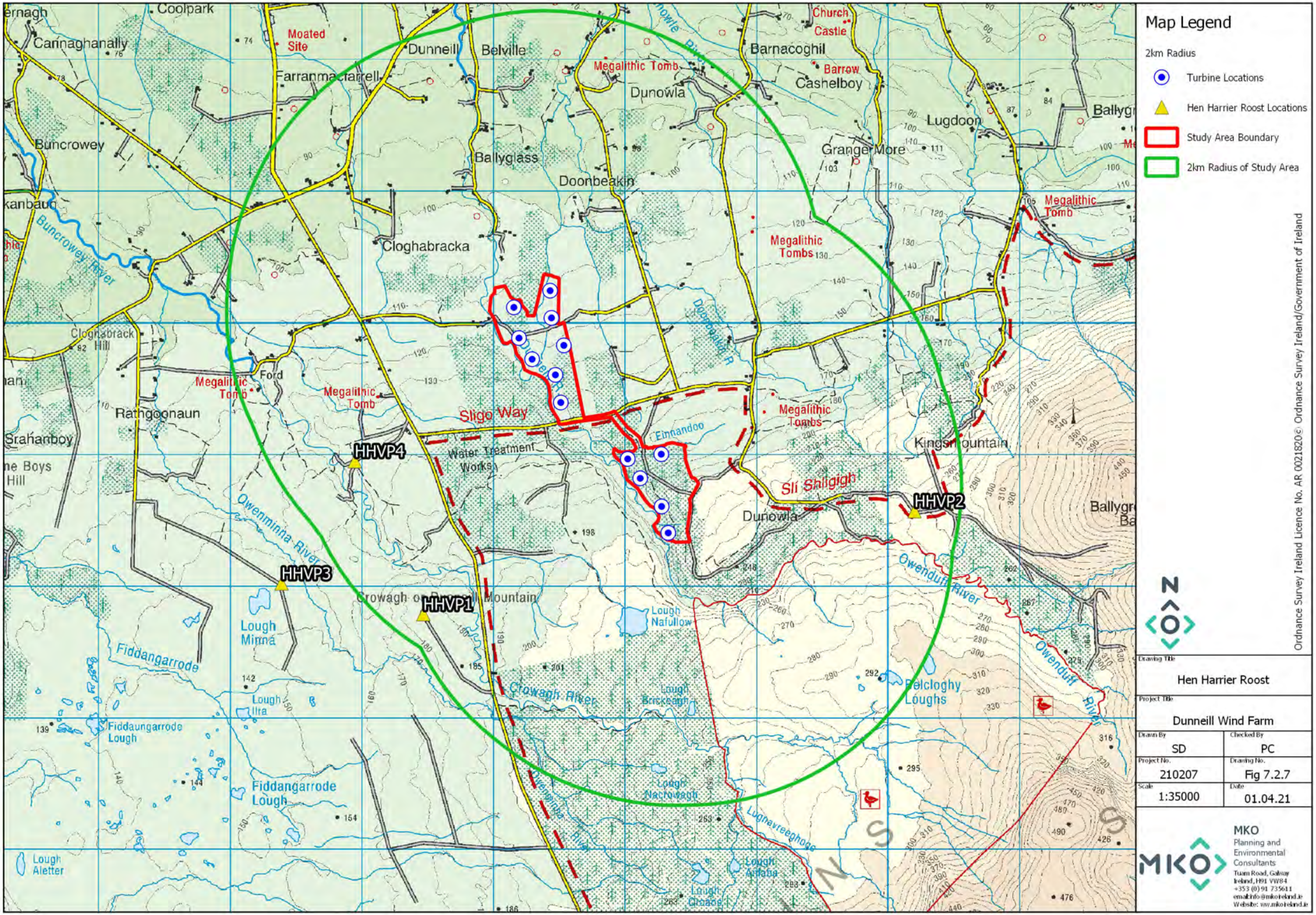
Lough Brickeagh
Lough Ilra


Map Legend
2km Radius
Turbine Locations
Hen Harrier Roost Locations
Study Area Boundary
2km Radius of Study Area
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Drawing Title
Hen Harrier Roost
Project Title
Dunneill Wind Farm
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Slí Shligigh
Coolpark
Cannaghanally
Moated Site
Dunneill
Belville
Farranmacfarrell
Megalithic Tomb
Dunowla
Barnacoghil
Church Castle
Barrow
Cashelboy
Lugdoon
Buncrowey
Ballyglass
Grange More
Doonbeakin
Cloghabracka
Megalithic Tombs
Buncrowey River
Cloghabrack Hill
Ford
Rathgoonaun
Srahanboy
Water Treatment Works
Kingsmountain
Dunowla
Owenminna River
Owenduff River
Crowagh or Bonniconlon Mountain
Lough Minna
Lough Nafullow
Fiddangarrode
Lough Ultra
Fiddaungarrode Lough
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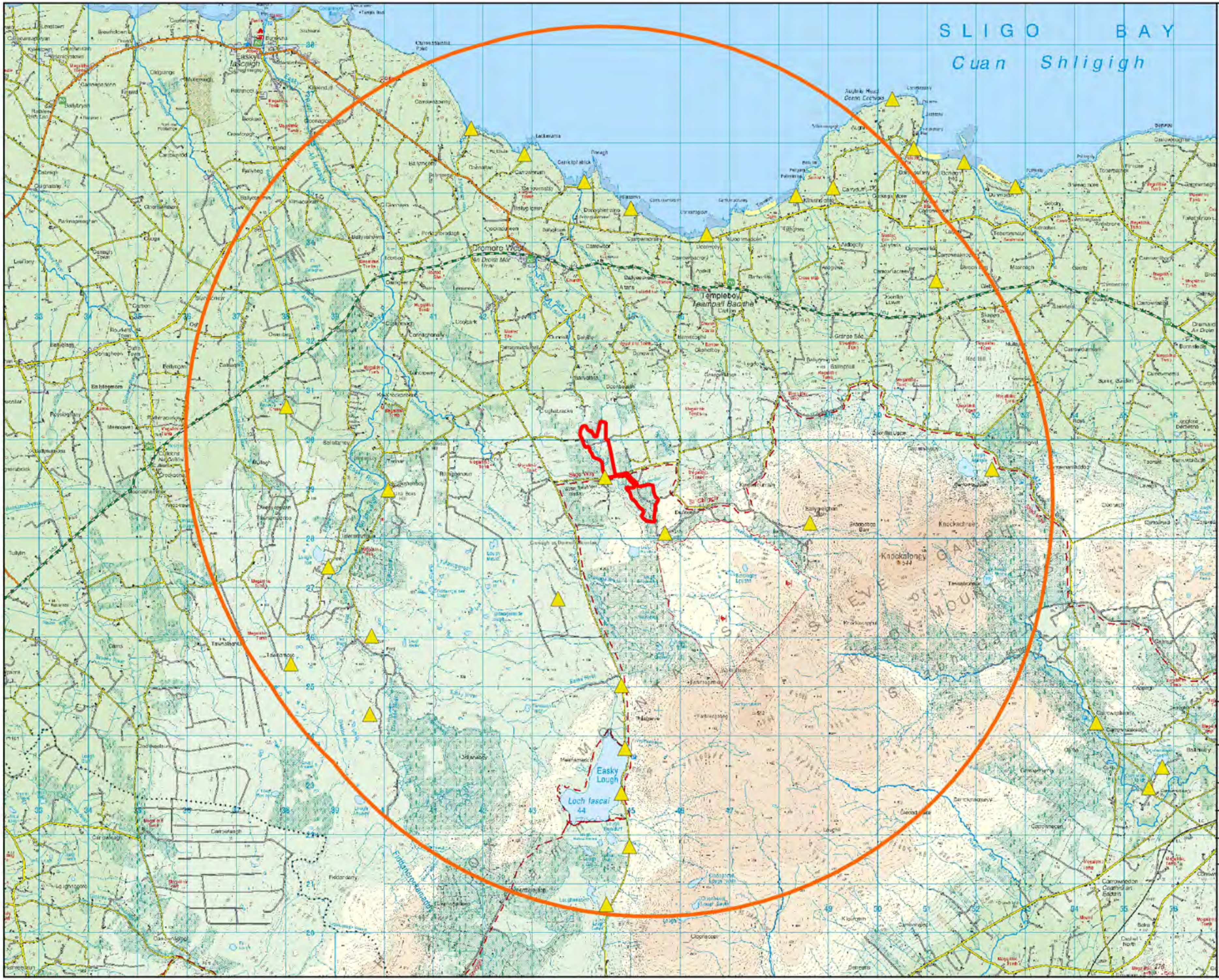
Lough Briskeagh
Belcloghy Loughs
Lough Nacroaghy
Lughnavreeghoge
Lough Aletter
Ballygr



Map Legend

- Survey Locations
- Study Area Boundary
- 8km Radius of Study Area

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Waterbird Distribution Survey	
Project Title	
Dunneill Wind Farm	
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Project No.: 210207	Drawing No.: Fig 7.2.8
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7.2.6 Receptor Evaluation and Impact Assessment

7.2.6.1 Potential Impacts Associated with Proposed Development

Wind farms present three potential risks to birds (Drewitt and Langston 2006, 2008; Band *et al.* 2007):

- **Direct habitat loss** due to wind farm infrastructure.
- **Disturbance displacement** (sometimes called indirect habitat loss) if birds avoid the wind farm and its surrounding area due to turbine operation. Displacement may also include barrier effects in which birds are deterred from using normal routes to feeding or roosting grounds.
- Death through **collision** or interaction with turbine blades and other infrastructure.

For each of these three risks, the detailed knowledge of bird distribution and flight activity within and surrounding the wind farm study area has been used to predict potential impacts of the Proposed Development on birds. These impacts are also assessed cumulatively with other projects. The geographical framework and description of impacts are described below.

7.2.6.2 Geographical Framework

Guidance on Ecological Impact Assessment (CIEEM, 2019) recommends categories of ornithological value that relate to a geographical framework (e.g. international through to local). This EIAR utilises the geographical framework described in 'Guidelines for Assessment of Ecological Impact of National Road Schemes' (NRA, 2009). The following geographic frame of reference should be used when determining the value of a bird population:

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

Locally Important (Lower Value) receptors are habitats and species that are widespread and of low ecological significance and important only in the local area. In contrast, Internationally Important sites are designated for conservation as part of the Natura 2000 Network (Special Area of Conservation or Special Protection Area) or provide the best examples of habitats or internationally important populations of protected flora and fauna.

7.2.6.3 Description of Impacts

The sensitivity, magnitude and significance of impacts on bird populations resulting from the Proposed Development was quantified according to two assessment criteria: Percival (2003) and the Environmental Protection Agency (EPA, 2022). The two assessment criteria have been used to independently characterise impacts to inform a robust assessment of potential impacts. EPA impact assessment criteria has been used for consistency between the Biodiversity and Ornithology chapters of this EIAR, while Percival (2003) has also been followed given its specific focus on birds.

Percival (2003) criteria

The Percival (2003) methodology quantifies the sensitivity of a given species to the development type, the magnitude of the effect and the significance of the potential impact. Table 7-3 (Sensitivity), Table 7-4 (Magnitude of effect) and Table 7-5 (Determination of significance) outline the assessment criteria for each stage.

Table 7-3 Evaluation of sensitivity for birds (from Percival, 2003)

Sensitivity	Determining Factor
Very High	Species that form the cited interest of SPAs and other statutorily protected nature conservation areas. Cited means mentioned in the citation text for the site as a species for which the site is designated.
High	Species that contribute to the integrity of a SPA but which are not cited as a species for which the site is designated. Ecologically sensitive species including the following: divers, common scoter, hen harrier, golden eagle, red necked phalarope, roseate tern and chough. Species present in nationally important numbers (>1% of the Irish population)
Medium	Species listed on Annex 1 of the EU Birds Directive. Species present in county (regionally) important numbers (>1% county population). Species on BirdWatch Ireland's Red List of Birds of Conservation Concern
Low	Any other species of conservation interest, including species on BirdWatch Ireland's Amber List of Birds of Conservation Concern, not covered above.

Table 7-4 Determination of magnitude of effects (from Percival, 2003)

Sensitivity	Description
Very High	Total loss or very major alteration to key elements/ features of the baseline conditions, such that the post development character/composition/attributes will be fundamentally changed and may be lost from the site altogether. Guide: < 20% of population / habitat remains
High	Major loss or major alteration to key elements/features of the baseline (pre-development) conditions such that post development character/composition/attributes will be fundamentally changed. Guide: 20-80% of population/ habitat lost
Medium	Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/composition/attributes of baseline will be partially changed. Guide: 5-20% of population/ habitat lost
Low	Minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible but underlying character/composition/attributes of baseline condition will be similar to pre-development circumstances/patterns. Guide: 1-5% of population/ habitat lost
Negligible	Very slight change from baseline condition. Change barely distinguishable, approximating to the "no change" situation. Guide: < 1% population/ habitat lost

Table 7-5 Significance matrix combining magnitude and sensitivity to assess significance (from Percival, 2003)

Significance		Sensitivity			
		Very High	High	Medium	Low
Magnitude	Very High	Very High	Very High	High	Medium
	High	Very High	Very High	Medium	Low
	Medium	Very High	High	Low	Very Low
	Low	Medium	Low	Low	Very Low
	Negligible	Low	Very Low	Very Low	Very Low

EPA (2022) Criteria

EPA criteria use the following terms to describe the quality of the effect:

- **Positive** - a change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
- **Neutral** - no effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
- **Negative** - a change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).

The significance of the effect is quantified as:

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

The duration of effects can be:

- **Momentary** – effects lasting from seconds to minutes.
- **Brief** – effects lasting less than a day.
- **Temporary** – effects lasting less than a year.
- **Short-term** – effects lasting 1 to 7 years.
- **Medium term** – effects lasting 7 to 15 years.
- **Long term** – effects lasting 15 to 60 years.
- **Permanent** – effects lasting over 60 years.
- **Reversible** – effects that can be undone (eg. through remediation or restoration).

The frequency of effects (ie. how often the effect will occur) can be:

- **Once, rarely, occasionally, frequently** or **constantly**
- **Hourly, daily, weekly, monthly** or **annually**

The probability of the effect may be:

- **Likely** – the effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
- **Unlikely** – the effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.

The effects may also be described in relation to their extent and context. Extent describes the population affected by an effect, while context relates the effect to the established baseline conditions.

7.2.7 Assessment Justification

7.2.7.1 Survey Data

A comprehensive suite of bird surveys was undertaken at the Proposed Development site between April 2021 and March 2022. Results derived from a continuous year of surveying at the wind farm study area and hinterland, undertaken in line with NatureScot guidance, are analysed to inform this assessment. As operational wind farms are likely to have a reduced bird interest compared with similar sites pre-development, only one year of fresh surveys was required (SNH, 2014). As such, the surveys undertaken provide the information necessary to allow a complete, comprehensive and robust assessment of the potential impacts of the Proposed Development on avian receptors.

7.2.7.2 Limitations

The information provided in this EIAR chapter accurately and comprehensively describes the baseline environment and provides an informed prediction of the likely impacts of the Proposed Development. It also prescribes mitigation as necessary and describes the predicted residual effects. Furthermore, the specialist studies, analysis and reporting have been undertaken in accordance with the appropriate guidelines. Therefore, no significant limitations in the scope, scale or context of the assessment have been identified.

7.3 Baseline Ornithological Conditions

7.3.1 Designated Sites within the Likely ZOI of the Development

A screening assessment and Natura Impact Statement (NIS) were prepared to provide the competent authority with the information necessary to complete an Appropriate Assessment for the Proposed Development in compliance with Article 6(3) of the EU Habitats Directive (92/43/EEC). According to EPA (2022) "*A biodiversity section of an EIAR … should not repeat the detailed assessment of potential effects on European sites contained in documentation prepared as part of the Appropriate Assessment process, but it should refer to the findings of that separate assessment*". Therefore, this section provides a brief summary of the key screening assessment findings regarding SPAs and nationally designated sites. A summary of findings regarding Special Areas of Conservation is provided in Chapter 6 of this EIAR. For a detailed assessment of any potential impacts on SPAs, refer to the Appropriate Assessment and NIS associated with Chapter 6 of this EIAR.

Sites designated for nature conservation within the potential ZOI of the Proposed Development were identified using GIS software. The ZOI is derived utilising a precautionary approach. Initially, sites within a 15km radius of the proposed works are identified. Then designated sites located outside the 15km buffer zone are accounted for and assessed for pathways for impacts. In this case, no potential for direct or indirect impacts for species listed as SCIs of SPAs more than 15km from the Proposed Development was identified.

In addition (and in the absence of any specific European or Irish guidance), the guidance document 'Assessing Connectivity with Special Protection Areas' (SNH, 2016) was consulted. This document provides guidance on identifying of connectivity between the Proposed Development and SPAs. It considers the distances some species may travel beyond the boundary of their SPAs and outlines dispersal and foraging ranges. Potential effects on wetlands and supporting habitats associated with SPAs and potential indirect pathways in the form of surface water pollution are considered in the Appropriate Assessment and NIS and summarised below.

Two SPAs were located within 15km of the Proposed Development. A third SPA was located just over 15km from the Proposed Development, therefore is included here on a precautionary basis. The SPAs are listed and summarised in Table 7-6.

Table 7-6 Designated sites in the Zone of Influence

European Site	Distance from proposed works	Special Conservation Interests for which the European Site has been designated	Conservation Objectives	Zone of Influence Determination and Identification of Pathways for Effect
Special Protection Area				
Aughris Head SPA	7.8km from the wind farm study area	Kittiwake (*Rissa tridactyla*) [A188]	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA.	The wind farm study area is located entirely outside of this SPA. The wind farm also has no hydrological connectivity with the SPA. The SCI kittiwake is a strictly coastal species: birds breed on the coast during summer and disperse to sea during winter. As the wind farm is located 7.8km inland from Aughris Head SPA, kittiwake are not dependent on the habitats within or near the wind farm. In conclusion, **this site is not within the Likely Zone of Impact and no further assessment is required.**

European Site	Distance from proposed works	Special Conservation Interests for which the European Site has been designated	Conservation Objectives	Zone of Influence Determination and Identification of Pathways for Effect
Special Protection Area				
Ballysadare Bay SPA	13.2km from the wind farm study area	- Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] - Grey Plover (*Pluvialis squatarola*) [A141] - Dunlin (*Calidris alpina*) [A149] - Bar-tailed Godwit (*Limosa lapponica*) [A157] - Redshank (*Tringa totanus*) [A162] - Wetland and Waterbirds [A999]	To maintain the favourable conservation condition of brent goose, grey plover, dunlin, bar-tailed godwit and redshank in Ballysadare Bay SPA, as defined by population trend and distribution. The long-term population trend of these species should be stable or increasing. There should be no significant decrease in the range, timing and intensity of use of areas of the SPA by these species, other than that occurring from natural patterns of variation. To maintain the favourable conservation condition of the wetland habitat in Ballysadare Bay SPA as a resource for the regularly-occurring migratory waterbirds that utilise it. The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 2,130ha, other than that occurring from natural patterns of variation.	The wind farm study area is located entirely outside of this SPA. The wind farm also has no hydrological connectivity with the SPA. Of the SCIs, grey plover and bar-tailed godwit use coastal and estuarine habitats. As the wind farm is located 13.2km inland from Ballysadare Bay SPA, these species are not dependent on the habitats within or near the wind farm. Brent goose, dunlin and redshank may be found in both coastal and inland sites. However, the core foraging range of these species is not within range of the wind farm (located 13.2km from Ballysadare Bay SPA). In conclusion, **this site is not within the Likely Zone of Impact and no further assessment is required.**

European Site	Distance from proposed works	Special Conservation Interests for which the European Site has been designated	Conservation Objectives	Zone of Influence Determination and Identification of Pathways for Effect
Special Protection Area				
Killala Bay/Moy Estuary SPA	15.3km from the wind farm study area	Ringed Plover (*Charadrius hiaticula*) [A137] Golden Plover (*Pluvialis apricaria*) [A140] Grey Plover (*Pluvialis squatarola*) [A141] Sanderling (*Calidris alba*) [A144] Dunlin (*Calidris alpina*) [A149] Bar-tailed Godwit (*Limosa lapponica*) [A157] Curlew (*Numenius arquata*) [A160] Redshank (*Tringa totanus*) [A162] Wetland and Waterbirds [A999]	To maintain the favourable conservation condition of ringed plover, golden plover, grey plover, sanderling, dunlin, bar-tailed godwit, curlew and redshank in Killala Bay/Moy Estuary SPA, as defined by population trend and distribution. The long-term population trend of these species should be stable or increasing. There should be no significant decrease in the range, timing and intensity of use of areas of the SPA by these species, other than that occurring from natural patterns of variation. To maintain the favourable conservation condition of the wetland habitat in Killala Bay/Moy Estuary SPA as a resource for the regularly-occurring migratory waterbirds that utilise it. The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 3,204ha, other than that occurring from natural patterns of variation.	The wind farm study area is located entirely outside of this SPA. The wind farm also has no hydrological connectivity with the SPA. Of the SCIs, grey plover, sanderling and bar-tailed godwit use coastal and estuarine habitats. As the wind farm is located over 15km inland from Killala Bay/Moy Estuary SPA, these species are not dependent on the habitats within or near the wind farm. Ringed plover, golden plover, dunlin, curlew and redshank may be found in both coastal and inland sites. However, the core foraging range of these species is not within range of the wind farm (located over 15.3km from Killala Bay/Moy Estuary SPA). In conclusion, **this site is not within the Likely Zone of Impact and no further assessment is required.**
National Heritage Area or proposed Natural Heritage Area				
Other than sites which are encompassed by the above list of SPAs, no nationally designated sites of ornithological significance occur within the potential ZOI.				

7.3.2 Breeding and Wintering Bird Atlas Records

"Bird Atlas 2007-11: The breeding and wintering birds of Britain and Ireland" (Balmer *et al.*, 2013) is the most recent comprehensive work on wintering and breeding birds in Ireland. Previous Bird Atlases have been the primary source of information on the distribution and abundance of British and Irish birds prior to Bird Atlas 2007–11. The three previously published atlases were:

- The atlas of breeding birds in Britain and Ireland (Sharrock, 1976)
- The atlas of wintering birds in Britain and Ireland (Lack, 1986)
- The new atlas of breeding birds in Britain and Ireland: 1988-1991 (Gibbons *et al.,* 1993)

The wind farm study area lies within hectads G42 and G43. Tables 7-7 and 7-8 present a list of species of conservation interest recorded from the relevant hectads, with regard to breeding and wintering respectively.

Table 7-7 Breeding Bird Atlas data. The following applies to conservation status: Section 19 and Schedule 4 of the Wildlife Acts 1976-2021, Annex I of the Birds Directive, Red List species on the BoCCI

Species Name	Breeding Atlas 1968-1972		Breeding Atlas 1988-1991		Breeding Atlas 2007-2011		Conservation Status
	G42	G43	G42	G43	G42	G43	
Black Guillemot	-	confirmed	-	breeding	-	-	Section 19
Black-headed Gull	-	possible	seen	-	-	-	Section 19
Common Gull	confirmed	-	breeding	-	confirmed	-	Section 19
Common Sandpiper	confirmed	confirmed	breeding	breeding	confirmed	-	Section 19
Common Tern	-	possible	-	-	-	-	Annex I & Section 19
Cormorant	-	confirmed	-	seen	-	-	Section 19
Corncrake	-	probable	-	-	-	possible	Annex I & Red List & Section 19
Curlew	-	probable	-	seen	-	-	Red List & Section 19
Dunlin	-	-	seen	-	possible		Annex I & Red List & Section 19
Fulmar	-	confirmed		breeding	-	confirmed	Section 19
Golden Plover	-	-	breeding	-	-	-	Annex I & Red List & Section 19
Grey Heron	-	possible	-	-	possible	-	Section 19
Grey Wagtail	confirmed	confirmed	breeding	breeding	probable	probable	Red List & Section 19
Great Black-backed Gull	-	-	seen	seen	-	-	

Species Name	Breeding Atlas 1968-1972		Breeding Atlas 1988-1991		Breeding Atlas 2007-2011		Conservation Status
	G42	G43	G42	G43	G42	G43	
Guillemot	-	confirmed	-	breeding	-	confirmed	Section 19
Herring Gull	-	confirmed	-	breeding	-	-	Section 19
Kestrel	probable	possible	-	breeding	possible	probable	Red List & Schedule 4 & Section 19
Kittiwake	-	confirmed	-	breeding	-	confirmed	Red List & Section 19
Lapwing	-	confirmed	-	-	-	-	Red List & Section 19
Lesser Black-backed Gull	probable	-	seen	seen	possible	-	Section 19
Mallard	confirmed	probable	seen	breeding	possible	possible	Section 19
Meadow Pipit	confirmed	confirmed	breeding	breeding	confirmed	confirmed	Red List & Section 19
Merlin	possible	-	-	-	possible	-	Annex I & Schedule 4
Moorhen	confirmed	possible	-	breeding	-	possible	Section 19
Oystercatcher	-	probable	-	breeding	-	-	Red List & Section 19
Peregrine Falcon	-	-	-	-	possible	-	Annex I & Schedule 4
Razorbill	-	confirmed	-	breeding	-	confirmed	Red List & Section 19
Red Grouse	-	-	seen	breeding	-	-	Red List & Section 19
Ringed Plover	-	confirmed	-	seen	-	-	Section 19
Shag	-	confirmed	-	breeding	-	confirmed	Section 19
Shelduck	-	probable	-	-	-	-	Section 19
Shoveler	-	-	-	breeding	-	-	Red List & Section 19
Snipe	confirmed	probable	seen	breeding	possible	possible	Red List & Section 19
Sparrowhawk	-	probable	-	-	-	probable	Schedule 4 & Section 19
Stock Dove	-	possible	-	-	-	-	Red List & Section 19
Swift	-	-	-	breeding	-	-	Red List & Section 19

Species Name	Breeding Atlas 1968-1972		Breeding Atlas 1988-1991		Breeding Atlas 2007-2011		Conservation Status
	G42	G43	G42	G43	G42	G43	
Teal	-	-	-	-	probable	-	Section 19
Whinchat	-	confirmed	-	seen	-	-	Red List & Section 19
Yellowhammer	probable	confirmed	-	-	-	-	Red List & Section 19

Table 7-8 Wintering Bird Atlas data. The following applies to conservation status: Section 19 and Schedule 4 of the Wildlife Acts 1976-2021, Annex I of the Birds Directive, Red List species on the BoCCI.

Species Name	Wintering Atlas 1981-1984		Wintering Atlas 2007-2011		Conservation Status
	G42	G43	G42	G43	
Barnacle Goose	-	-	present	-	Annex I & Section 19
Black Guillemot	-	-	-	present	Section 19
Black-headed Gull	-	present	-	present	Section 19
Common Gull	-	present	-	present	Section 19
Cormorant	present	present	present	present	Section 19
Curlew	-	present	-	present	Red List & Section 19
Dark-bellied Brent Goose	-	-	-	present	Section 19
Dunlin	-	present	-	present	Annex I & Red List & Section 19
Fulmar	-	present	-	present	Section 19
Gannet	-	present	-	-	Section 19
Glaucous Gull	-	present	-	present	Section 19
Golden Plover	-	present	-	-	Annex I & Red List & Section 19
Great Black-backed Gull	-	present	-	present	
Great Northern Diver	-	present	-	present	Annex I & Section 19
Greenshank	-	present	-	present	Section 19
Grey Heron	present	present	present	present	Section 19
Grey Plover	-	present	-	-	Red List & Section 19

Species Name	Wintering Atlas 1981-1984		Wintering Atlas 2007-2011		Conservation Status
	G42	G43	G42	G43	
Grey Wagtail	-	present	-	present	Red List & Section 19
Guillemot	-	-	-	present	Section 19
Hen Harrier	-	-	present	present	Annex I & Schedule 4
Herring Gull	-	present	-	present	Section 19
Iceland Gull	-	-	-	present	Section 19
Jack Snipe	-	present	-	-	Section 19
Kestrel	-	present	present	present	Red List & Schedule 4 & Section 19
Knot	-	present	-	-	Red List & Section 19
Lapwing	-	present	-	present	Red List & Section 19
Lesser Black-backed Gull	-	-	present	-	Section 19
Light-bellied Brent Goose	-	-	-	present	Section 19
Long-tailed Duck	-	present	-	present	Red List & Section 19
Mallard	-	present	present	present	Section 19
Meadow Pipit	present	present	present	present	Red List & Section 19
Merlin	present	-	present	present	Annex I & Schedule 4
Oystercatcher	-	present	-	present	Red List & Section 19
Pochard	present	-	-	-	Red List & Section 19
Purple Sandpiper	-	present	-	present	Red List & Section 19
Red-breasted Merganser	-	present	present	-	Section 19
Redshank	-	present	-	present	Red List & Section 19
Red-throated Diver	-	-	-	present	Annex I & Section 19
Redwing	present	present	present	present	Red List & Section 19

Species Name	Wintering Atlas 1981-1984		Wintering Atlas 2007-2011		Conservation Status
	G42	G43	G42	G43	
Ringed Plover	-	present	-	present	Section 19
Shag	-	present	-	present	Section 19
Snipe	present	present	present	present	Red List & Section 19
Sparrowhawk	present	present	present	-	Schedule 4 & Section 19
Teal	-	present	present	present	Section 19
Turnstone	-	present	-	present	Section 19
Whooper Swan	-	-	present	present	Annex I & Section 19
Wigeon	-	present	-	-	Section 19
Woodcock	present	present	present	present	Red List & Section 19
Yellowhammer	-	present	-	-	Red List & Section 19

7.3.3 Bird Sensitivity Mapping Tool

A Bird Sensitivity Mapping Tool for wind energy development was developed by BirdWatch Ireland to provide a measured spatial indication of where protected birds are likely to be sensitive to wind energy developments. The tool can be accessed via the National Biodiversity Data Centre Website (www.biodiversityireland.ie) and is accompanied by a guidance document (McGuiness *et al.*, 2015). The criteria for estimating a zone of sensitivity (i.e. 'low', 'medium', 'high' and 'highest') is based on a review of the behavioural, ecological and distributional data available for each species.

The wind farm study area is located within areas of **low** bird sensitivity (or "no data") to wind energy developments. The wind farm study area boundary is approximately 4km from the nearest area of medium sensitivity and approximately 28km from the nearest area of high sensitivity.

7.3.4 National Biodiversity Data Centre Records

The National Biodiversity Data Centre Biodiversity Maps provide records of flora and fauna within 10km hectads across Ireland. Data is available from the map viewer on the centre's website (https://maps.biodiversityireland.ie/Map). The wind farm study area lies within the 10km hectads G42 and G43. Table 7-9 lists the bird species of conservation interest that have been recorded in these hectads.

Table 7-9 National Biodiversity Data Centre records

Common Name	Scientific Name	Dataset
Barn Owl	Tyto alba	Birds of Ireland
Barnacle Goose	Branta leucopsis	Bird Atlas 2007 - 2011
Black Guillemot	Cepphus grylle	Birds of Ireland
Black-headed Gull	Larus ridibundus	Bird Atlas 2007 - 2011
Brent Goose	Branta bernicla	Bird Atlas 2007 - 2011
Buzzard	Buteo buteo	Birds of Ireland
Chough	Pyrrhocorax pyrrhocorax	Birds of Ireland
Common Gull	Larus canus	Bird Atlas 2007 - 2011
Common Sandpiper	Actitis hypoleucos	Bird Atlas 2007 - 2011 & The Second Atlas of Breeding Birds in Britain and Ireland: 1988-1991
Common Tern	Sterna hirundo	The First Atlas of Breeding Birds in Britain and Ireland: 1968-1972
Cormorant	Phalacrocorax carbo	Bird Atlas 2007 - 2011 & Birds of Ireland
Corncrake	Crex crex	Bird Atlas 2007 - 2011
Curlew	Numenius arquata	Birds of Ireland
Dunlin	Calidris alpina	Bird Atlas 2007 - 2011
Fulmar	Fulmarus glacialis	Birds of Ireland
Gannet	Morus bassanus	European Seabirds at Sea (ESAS) bird sightings 1980-2003
Glaucous Gull	Larus hyperboreus	Bird Atlas 2007 - 2011
Golden Plover	Pluvialis apricaria	The Second Atlas of Breeding Birds in Britain and Ireland: 1988-1991 & The First Atlas of Wintering Birds in Britain and Ireland: 1981/82-1983/84
Great Black-backed Gull	Larus marinus	The Second Atlas of Breeding Birds in Britain and Ireland: 1988-1991 & Bird Atlas 2007 - 2011
Great Northern Diver	Gavia immer	Bird Atlas 2007 - 2011
Greenshank	Tringa nebularia	Bird Atlas 2007 - 2011
Grey Heron	Ardea cinerea	Bird Atlas 2007 - 2011
Grey Plover	Pluvialis squatarola	The First Atlas of Wintering Birds in Britain and Ireland: 1981/82-1983/84
Grey Wagtail	Motacilla cinerea	Bird Atlas 2007 - 2011
Guillemot	Uria aalge	Bird Atlas 2007 - 2011
Hen Harrier	Circus cyaneus	Birds of Ireland & Bird Atlas 2007 - 2011
Herring Gull	Larus argentatus	Bird Atlas 2007 - 2011
Iceland Gull	Larus glaucoides	Bird Atlas 2007 - 2011
Jack Snipe	Lymnocryptes minimus	The First Atlas of Wintering Birds in Britain and Ireland: 1981/82-1983/84

Common Name	Scientific Name	Dataset
Kestrel	Falco tinnunculus	Bird Atlas 2007 - 2011
Kittiwake	Rissa tridactyla	Birds of Ireland
Lapwing	Vanellus vanellus	Bird Atlas 2007 - 2011
Lesser Black-backed Gull	Larus fuscus	Bird Atlas 2007 - 2011 & The Second Atlas of Breeding Birds in Britain and Ireland: 1988-1991
Long-tailed Duck	Clangula hyemalis	Bird Atlas 2007 - 2011
Mallard	Anas platyrhynchos	Bird Atlas 2007 - 2011
Manx Shearwater	Puffinus puffinus	European Seabirds at Sea (ESAS) bird sightings 1980-2003
Meadow Pipit	Anthus pratensis	Bird Atlas 2007 - 2011
Merlin	Falco columbarius	Bird Atlas 2007 - 2011
Moorhen	Gallinula chloropus	The First Atlas of Breeding Birds in Britain and Ireland: 1968-1972 & Bird Atlas 2007 - 2011
Oystercatcher	Haematopus ostralegus	Birds of Ireland
Peregrine Falcon	Falco peregrinus	Bird Atlas 2007 - 2011
Pochard	Aythya ferina	The First Atlas of Wintering Birds in Britain and Ireland: 1981/82-1983/84
Purple Sandpiper	Calidris maritima	Bird Atlas 2007 - 2011
Razorbill	Alca torda	Bird Atlas 2007 - 2011
Red Grouse	Lagopus lagopus	The Second Atlas of Breeding Birds in Britain and Ireland: 1988-1991
Red Knot	Calidris canutus	The First Atlas of Wintering Birds in Britain and Ireland: 1981/82-1983/84
Red-breasted Merganser	Mergus serrator	Bird Atlas 2007 - 2011 & The First Atlas of Wintering Birds in Britain and Ireland: 1981/82-1983/84
Redshank	Tringa totanus	Bird Atlas 2007 - 2011
Red-throated Diver	Gavia stellata	Bird Atlas 2007 - 2011
Redwing	Turdus iliacus	Bird Atlas 2007 - 2011
Ringed Plover	Charadrius hiaticula	Birds of Ireland
Shag	Phalacrocorax aristotelis	Birds of Ireland
Shelduck	Tadorna tadorna	The First Atlas of Breeding Birds in Britain and Ireland: 1968-1972
Shoveler	Anas clypeata	The Second Atlas of Breeding Birds in Britain and Ireland: 1988-1991
Snipe	Gallinago gallinago	Bird Atlas 2007 - 2011
Sparrowhawk	Accipiter nisus	Bird Atlas 2007 - 2011
Stock Dove	Columba oenas	The First Atlas of Breeding Birds in Britain and Ireland: 1968-1972.

Common Name	Scientific Name	Dataset
Storm Petrel	Hydrobates pelagicus	European Seabirds at Sea (ESAS) bird sightings 1980-2003
Swift	Apus apus	The Second Atlas of Breeding Birds in Britain and Ireland: 1988-1991
Teal	Anas crecca	Bird Atlas 2007 - 2011
Turnstone	Arenaria interpres	Bird Atlas 2007 - 2011
Whinchat	Saxicola rubetra	The Second Atlas of Breeding Birds in Britain and Ireland: 1988-1991
Whooper Swan	Cygnus cygnus	Bird Atlas 2007 - 2011
Wigeon	Anas penelope	The First Atlas of Wintering Birds in Britain and Ireland: 1981/82-1983/84
Woodcock	Scolopax rusticola	Bird Atlas 2007 – 2011
Yellowhammer	Emberiza citrinella	The First Atlas of Breeding Birds in Britain and Ireland: 1968-1972 & The First Atlas of Wintering Birds in Britain and Ireland: 1981/82-1983/84

7.3.5 Irish Wetland Bird Survey Records

The Irish Wetland Bird Survey (IWeBS), coordinated by BirdWatch Ireland, monitors wintering waterbird populations at their wetland sites across Ireland. IWeBS site locations are available at https://birdwatchireland.ie/our-work/. The nearest IWeBS subsites to the study area are Killala Bay (0D458) and Ballysadare Bay (0C486). Data from IWeBS sites in County Sligo have been used to estimate county populations of wintering waterbirds identified as KORs. Datasets for the following sites were downloaded from www.birdwatchireland.ie and reviewed:

- Ballysadare Bay
- Drumcliff Bay Estuary
- Garvogue River
- Inishmurray
- Lough Arrow
- Lough Gara
- Lough Gill
- Sligo Harbour

7.3.6 Rare and Protected Species Dataset

An information request was sent to National Parks and Wildlife Service (NPWS) requesting records from the Rare and Protected Species Database. The following records were obtained from the NPWS on the 16th of March 2022:

Corncrake

Records of corncrake in the 10km hectad G43, in which part of the study area lies, were obtained. There were 6 records of calling males in 2018 and 2 records in 2017.

Hen Harrier

Records of hen harrier in the 10km hectad G42, in which part of the study area lies, were obtained. There were 2 hen harrier sightings in 2005 (during the national survey).

7.3.7 Field Survey Results

A list of all bird species recorded during surveys is provided in Appendix 7-1. The target species listed in Table 7-10 below were recorded within the potential ZOI of the Proposed Development during field surveys. The list is ordered in accordance with conservation significance: Annex I species, SCIs of SPAs within 15km of the study area, Red listed BoCCI species and Schedule 4 species. Additional (non-target) species are listed in Appendix 7-1 and their presence/absence is inidicated in Appendix 7-3.

Table 7-10 Target species recorded in the Potential ZOI of the Proposed Development

Species	Conservation Significance
Barnacle Goose	Annex I of Birds Directive
Black-throated Diver	Annex I of Birds Directive
Dunlin	Annex I of Birds Directive, SCI of Ballysadare Bay SPA and Red List with respect to breeding and wintering populations
Golden Plover	Annex I of Birds Directive and Red List with respect to breeding and wintering populations
Great Northern Diver	Annex I of Birds Directive
Greenland White-fronted Goose	Annex I of Birds Directive
Hen Harrier	Annex I of Birds Directive and Schedule 4 of Wildlife Acts
Kingfisher	Annex I of Birds Directive
Mediterranean Gull	Annex I of Birds Directive
Merlin	Annex I of Birds Directive and Schedule 4 of Wildlife Acts
Peregrine	Annex I of Birds Directive and Schedule 4 of Wildlife Acts
Red Kite	Annex I of Birds Directive, Red List with respect to breeding populations and Schedule 4 of Wildlife Acts
Red-throated Diver	Annex I of Birds Directive
Storm Petrel	Annex I of Birds Directive
Whooper Swan	Annex I of Birds Directive
Brent Goose	SCI of Ballysadare Bay SPA
Kittiwake	SCI of Aughris Head SPA
Redshank	SCI of Ballysadare Bay SPA and Red List with respect to breeding and wintering populations
Curlew	Red List with respect to breeding and wintering populations
Eider	Red List with respect to breeding and wintering populations
Grey Wagtail	Red List with respect to breeding population
Kestrel	Red List with respect to breeding population and Schedule 4 of Wildlife Acts (1976-2021)

Species	Conservation Significance
Knot	Red List with respect to wintering population
Lapwing	Red List with respect to breeding and wintering populations
Long-tailed Duck	Red List with respect to wintering population
Meadow Pipit	Red List with respect to breeding population
Oystercatcher	Red List with respect to breeding and wintering populations
Purple Sandpiper	Red List with respect to wintering population
Razorbill	Red List with respect to breeding population
Red Grouse	Red List with respect to breeding population
Redwing	Red List with respect to wintering population
Shoveler	Red List with respect to breeding and wintering populations
Snipe	Red List with respect to breeding and wintering populations
Swift	Red List with respect to breeding population
Whinchat	Red List with respect to breeding population
Woodcock	Red List with respect to breeding population
Yellowhammer	Red List with respect to breeding population
Buzzard	Schedule 4 of Wildlife Acts (1976-2021)
Sparrowhawk	Schedule 4 of Wildlife Acts (1976-2021)

The following sections describe the records of each target species during individual survey types. Survey data and mapping for each target species are provided in Appendix 7-4, while Appendix 7-3 presents results summary tables including:

- Summary of vantage point survey records
- Summary of breeding and winter walkover survey records
- Summary of waterbird distribution survey records
- Summary of breeding raptor survey records
- Summary of breeding red grouse survey records
- Summary of breeding woodcock survey records
- Summary of non-target species recorded

7.3.7.1 Barnacle Goose

Barnacle goose was recorded during the wintering season. Raw survey data and maps are provided in Appendix 7-4.

Waterbird Distribution Survey

There was one record of barnacle goose during waterbird distribution surveys in an 8km radius of the wind farm. A flock of 23 birds was observed grazing on farmland along the coast over 5km north of the wind farm.

7.3.7.2 Black-throated Diver

Black-throated diver was recorded during the wintering season. Raw survey data and maps are provided in Appendix 7-4.

Waterbird Distribution Survey

There were three records of black-throated diver during waterbird distribution surveys in an 8km radius of the wind farm. Birds were seen foraging along the coastline over 4km north of the wind farm. Up to three individuals were counted.

7.3.7.3 Dunlin

Dunlin was recorded during the late breeding and wintering season. Raw survey data and maps are provided in Appendix 7-4.

Walkover Survey

Dunlin was recorded once during breeding walkover surveys. A single bird in breeding plumage was flushed from heather by the surveyor in July 2021, c.520m from the nearest turbine. The bird did not return (suggesting no young were present) and no other evidence of breeding was recorded. Furthermore, dunlin was not observed in this area during earlier breeding season walkover surveys in April, May and June 2021.

Waterbird Distribution Survey

There were nine records of dunlin during waterbird distribution surveys within an 8km radius of the wind farm. The majority of records were of birds foraging and roosting along the shoreline on the coast north of the wind farm, with flock sizes ranging from 4-250. A bird was also seen perched in heather in bog near Crowagh in August 2021, c.3.5km southwest of the wind farm; this bird was in breeding plumage, but no other evidence of breeding was observed.

7.3.7.4 Golden Plover

Golden plover was recorded during the passage (September) and winter season. Raw survey data and maps are provided in Appendix 7-4.

Waterbird Distribution Survey

There were nine records of golden plover during waterbird distribution surveys within an 8km radius of the wind farm. Birds were observed foraging and flying over bog south of the wind farm, in the Belcloghy Loughs (c.2km from the wind farm), Easky, Crowagh, Lough Minna and Kilcummin (all further than 2km from the wind farm). Between 1-250 birds were counted. A flock of 120 birds was also recorded roosting at Corkagh Beg, on the coastline north of the wind farm.

Incidental Records

There was one incidental record of golden plover during the survey period. A flock of three birds was flying over a blanket bog c.1.5km from the wind farm in October 2021.

7.3.7.5 Great Northern Diver

Great northern diver was recorded during the passage and winter season. Raw survey data and maps are provided in Appendix 7-4.

Waterbird Distribution Survey

There were 24 records of great northern diver during waterbird distribution surveys within an 8km radius of the wind farm. Most birds were observed swimming, foraging and preening in the sea along the coastline over 4km north of the wind farm. A bird was also observed swimming and diving in Easky Lough, 5km south of the wind farm. The maximum count was six birds.

7.3.7.6 Greenland White-fronted Goose

Greenland white-fronted goose was recorded during the winter season. Raw survey data and maps are provided in Appendix 7-4.

Waterbird Distribution Survey

Greenland white-fronted goose was recorded once during waterbird distribution surveys within an 8km radius of the wind farm. A flock of 14 birds were observed flying high over the uplands at Fiddandarry, over 7km from the wind farm, in November 2021.

7.3.7.7 Hen Harrier

Hen harrier was recorded during the breeding and wintering season. Raw survey data and maps are provided in Appendix 7-4.

Vantage Point Survey

There were four records of hen harrier during vantage point surveys in the winter season; three flights and one non-flight. A male was observed hunting over blanket bog to the west of the wind farm in November 2021 and January 2022. A male was also observed perched eating prey c.350m from the nearest turbine in an area of bog adjacent to the wind farm in January 2022.

Breeding Raptor Survey

Hen harrier was observed once during breeding raptor surveys. A hunting male was perched at the edge of young conifers in late May 2021, c.370m from the nearest turbine. No breeding behaviour was observed.

Incidental Records

There were two incidental records of hen harrier during the survey period. In September 2021, an individual was observed flying out of a perch in a bog around Lough Minna, over 5km from the wind farm. In November 2021, an individual flew out of a perch on the edge of the forestry at Portabradagh, c.4.5km from the wind farm.

7.3.7.8 Kingfisher

Kingfisher was recorded during the wintering season. Raw survey data and maps are provided in Appendix 7-4.

Incidental Records

There was one incidental record of kingfisher over the survey period. A bird was observed flying and perching along the Easky River in November 2021. This observation was in Gleneasky, over 4km from the wind farm.

7.3.7.9 Mediterranean Gull

Mediterranean gull was recorded during the winter season. Raw survey data and maps are provided in Appendix 7-4.

Waterbird Distribution Survey

Mediterranean gull was recorded once during waterbird distribution surveys within an 8km radius of the wind farm. A flock of six birds were flying along the exposed coast at Aughris Head, 8km from the wind farm, in November 2021.

7.3.7.10 Merlin

Merlin was recorded during the breeding and wintering season. Raw survey data and maps are provided in Appendix 7-4.

Vantage Point Survey

Merlin was recorded twice during vantage point surveys. A bird was observed flying across a bog adjacent to the study area c.580m from the nearest turbine in December 2021 and a bird was perched on a fencepost along the edge of some forestry c.330m from the nearest turbine in September 2021.

Breeding Raptor Survey

There were five records of merlin during breeding raptor surveys, including individuals in suitable breeding habitat. Single birds were observed flying and perching in heather and young forestry between April and July 2021. Observations were within a 2km radius of the wind farm, with the nearest observation to the wind farm being c.670m from the nearest turbine.

Incidental Records

There were 16 incidental records of merlin over the survey period between June 2021 and February 2022, during surveys within the wind farm and up to an 8km radius. Birds were observed flying, hunting passerines and perched in bog and conifer forestry. Individual birds were observed on each occasion, sometimes identified as a female. The nearest record to the wind farm was at Lough Nafllow, c.620m from the nearest turbine.

In addition, a merlin nest was identified by MKO surveyors in May 2022. This observation was made after the study period ended, but was considered relevant to this impact assessment and included here. The nest is located at Easky Lough. Easky Lough is 4.2km south of the wind farm study area at the nearest point.

7.3.7.11 Peregrine

Peregrine was recorded during the wintering season. Raw survey data and maps are provided in Appendix 7-4.

Incidental Records

There were two incidental records of peregrine over the survey period. A likely post-breeding pair/family group was observed flying over Lough Aghree in October 2021 and an individual was observed commuting over Ballynahowna bog in November 2021, both over 5km from the wind farm.

7.3.7.12 Red Kite

Red kite was recorded during the wintering season. Raw survey data and maps are provided in Appendix 7-4.

Incidental Records

There was one incidental record of red kite over the survey period. A bird was observed soaring over upland farmland near Cooper's Lodge, 8km south of the wind farm, in November 2021.

7.3.7.13 Red-throated Diver

Red-throated diver was recorded during the passage and winter season. Raw survey data and maps are provided in Appendix 7-4.

Waterbird Distribution Survey

There were nine records of red-throated diver during waterbird distribution surveys within an 8km radius of the wind farm. Most birds were foraging and preening on the coastline north of the wind farm. A bird was also observed swimming in Easky Lough, 5km south of the wind farm. The maximum count was two birds.

7.3.7.14 Storm Petrel

Storm petrel was recorded during the passage season. Raw survey data and maps are provided in Appendix 7-4.

Waterbird Distribution Survey

Storm petrel was recorded once during waterbird distribution surveys within an 8km radius of the wind farm. A flock of 19 birds was observed flying across the water at Aughris Head in September 2021.

7.3.7.15 Whooper Swan

Whooper swan was recorded during the winter season. Raw survey data and maps are provided in Appendix 7-4.

Vantage Point Survey

There was one observation of whooper swans during vantage point surveys. A flock of four were observed commuting, over 2km north of the study area in December 2021.

Waterbird Distribution Survey

Whooper swan were recorded 13 times during waterbird distribution surveys within an 8km radius of the wind farm. Birds were foraging on lakes and grassland throughout the hinterland, the nearest record being c.4.5km from the wind farm. The maximum count was 15 birds.

Incidental Records

There were two further incidental records of whooper swan over the survey period. A flock of three and a flock of eight birds were observed commuting over 500m to the northwest of the wind farm in November 2021.

7.3.7.16 Brent Goose

Brent goose was recorded during the winter season. Raw survey data and maps are provided in Appendix 7-4.

Vantage Point Survey

There were two flight records of brent geese during vantage point surveys. Both flights were of single birds and both were over 200m from the turbines (one to the north of the wind farm and one to the west).

Waterbird Distribution Survey

Brent goose was recorded 29 times during waterbird distribution surveys within an 8km radius of the wind farm. Birds were seen foraging and flying on the coastline over 4km north of the wind farm. Flock sizes ranged from 2-43 birds.

7.3.7.17 Kittiwake

Kittiwake was recorded during the passage and wintering season. Raw survey data and maps are provided in Appendix 7-4.

Waterbird Distribution Survey

There were 14 records of kittiwake during waterbird distribution surveys within an 8km radius of the wind farm. Birds were seen swimming and flying on the coastline over 4km north of the wind farm. Flock sizes ranged from 2-65 birds.

7.3.7.18 Redshank

Redshank was recorded during the late breeding and winter season. Raw survey data and maps are provided in Appendix 7-4.

Waterbird Distribution Survey

There were 33 records of redshank during waterbird distribution surveys within an 8km radius of the wind farm. Most birds were foraging and roosting throughout the shoreline between Carrownabinny and Dunmoran Strand, over 4km north of the wind farm. On one occasion, two birds were also observed at Tonaloughan Lough, 4km southwest of the wind farm, in August 2021. The maximum count was 34 birds.

7.3.7.19 Curlew

Curlew was recorded during the late breeding and wintering season. Raw survey data and maps are provided in Appendix 7-4.

Waterbird Distribution Survey

There were 46 records of curlew during waterbird distribution surveys within an 8km radius of the wind farm. Birds were observed foraging, roosting and flying on the coastline and coastal grassland over 3.5km north of the wind farm. The maximum count was 23 birds. Non-breeding curlew were observed late in the breeding season (August and September 2021), and no evidence of breeding was recorded.

7.3.7.20 Eider

Eider was recorded during the wintering season. Raw survey data and maps are provided in Appendix 7-4.

Waterbird Distribution Survey

There were ten records of eider during waterbird distribution surveys within an 8km radius of the wind farm. Birds were observed foraging, roosting and preening on the coastline over 5km north of the wind farm, particularly in the area of Dunmoran Strand. Between 1-20 birds were counted.

7.3.7.21 Grey Wagtail

Grey wagtail was recorded during the breeding and wintering season. Raw survey data are provided in Appendix 7-4.

Walkover Survey

There was a single record of grey wagtail during breeding season walkovers. A pair was observed on a stream along the western boundary of the wind farm in June 2021 (a probable breeding record).

Incidental Records

There were five incidental records of grey wagtail during the survey period. Pairs were observed on rivers and roads, foraging and flitting, during May, June and August 2021. Pairs of birds were also observed foraging on coast roads in November 2021. Of the records, only one was within the wind farm (near turbine 12).

7.3.7.22 Kestrel

Kestrel was recorded during the breeding and wintering season. Raw survey data and maps are provided in Appendix 7-4.

Vantage Point Survey

There were 17 records of kestrel during vantage point surveys; 15 flights and 2 non-flight. Of the records, five (29%) were 50-100m from the turbines, one (6%) was 100-150m from the turbines, one (6%) was 150-200m from the turbines, five (29%) were 200-500m from the turbines and five (29%) were over 500m from the turbines. Kestrel were hunting in woodland, bog and grassland within 100m of the turbines.

Breeding Raptor Survey

Kestrel was recorded eight times during breeding raptor surveys, including probable breeding records. Single birds were observed hunting over bog and forestry between April and July 2021, and a displaying pair was observed chasing one another over bog and forestry in late April. Observations were within a

2km radius of the wind farm, and birds were also observed hunting within 300m of the turbines on one occasion.

Walkover Survey

There was one record of kestrel during breeding walkover surveys (confirmed breeding) and two records during winter walkover surveys. In May 2021, a bird was observed carrying prey northwards, to the east of the wind farm site, c.640m from the nearest turbine. It is possible that this is the same bird observed displaying during breeding raptor surveys in April, as observations were in the same general area. In January 2022 a bird was hovering to the west of the wind farm site, c.380m from the nearest turbine, while in March 2022, a bird was hunting in the wind farm site, c.160m from the nearest turbine.

Incidental Records

There were 14 incidental records of kestrel over the survey period. All records were collected during surveys up to an 8km radius around the wind farm. Birds were hunting in bog, grassland and scrub. A pair of birds were also observed chasing one another in Tawnamore bog, over 5km from the wind farm, in September 2021.

7.3.7.23 Knot

Knot was recorded during the wintering season. Raw survey data and maps are provided in Appendix 7-4.

Waterbird Distribution Survey

There were two records of knot during waterbird distribution surveys within an 8km radius of the wind farm. Birds were foraging on the shoreline at Lackavarna (two birds) and Carricknagauv (one bird) in January 2022, over 4km north of the wind farm.

7.3.7.24 Lapwing

Lapwing was recorded during the late breeding and wintering season. Raw survey data and maps are provided in Appendix 7-4.

Vantage Point Survey

Lapwing was recorded once in flight during vantage point surveys. A flock of three birds flew along the south of the study area, c.225 from the nearest turbine, in August 2021.

Waterbird Distribution Survey

There were 11 records of lapwing during waterbird distribution surveys within an 8km radius of the wind farm. Birds were observed foraging, roosting and flying over bog, grassland and shoreline, in the Belcloghy Loughs (c.2km from the wind farm), Crowagh, Ballynahowna, Templeboy, Donaghintraine, Lough Minna, Owenykeevan and Corkagh Beg (all over 2km from the wind farm). Between 2-45 birds were counted.

Incidental Records

There was one incidental record of lapwing over the survey period. In July 2021, two birds were observed flying north across bog at Crowagh, during surveys within a 2km radius of the wind farm.

7.3.7.25 Long-tailed Duck

Long-tailed duck was recorded during the wintering season. Raw survey data and maps are provided in Appendix 7-4.

Waterbird Distribution Survey

Long-tailed duck was recorded once during waterbird distribution surveys within an 8km radius of the wind farm. A lone female was foraging in the sea at Dunmoran Strand in October 2021, over 8km northeast of the study area.

7.3.7.26 Meadow Pipit

Meadow pipit was recorded during the breeding and winter season. Raw survey data are provided in Appendix 7-4.

Vantage Point Survey

Meadow pipit were observed during vantage point surveys on 29 occasions throughout the year. Flock sizes ranged from 1-35 birds. Birds were using bog and grassland (including improved grassland), and display flights were observed within 500m of the wind farm in May 2021.

Walkover Survey

There were 55 records of meadow pipit during walkover surveys. Of these, ten were during breeding season walkovers between May and July 2021. Birds were using bog and grassland (including improved grassland). Display flights were observed (probable breeding) and the maximum count was 28 birds. The remaining 45 records were during winter walkover surveys between October 2021 and March 2022. Birds were flying and calling in bog, forestry and improved grassland. Singing males were recorded in March. The maximum count was six birds.

Incidental Records

There was a further 44 incidental records of meadow pipit over the survey period. Birds were observed flying, calling and displaying in grassland and bog habitat throughout the breeding and wintering season, during surveys within the wind farm, and up to an 8km radius. The maximum flock size was 39 birds.

7.3.7.27 Oystercatcher

Oystercatcher was recorded during the passage and winter season. Raw survey data and maps are provided in Appendix 7-4.

Waterbird Distribution Survey

There were 87 records of oystercatcher during waterbird distribution surveys within an 8km radius of the wind farm. Birds were observed foraging, roosting and preening throughout the shoreline between Carrownabinny and Pollykelly, over 4km north of the wind farm. The maximum count was 41 birds.

7.3.7.28 Purple Sandpiper

Purple sandpiper was recorded during the winter season. Raw survey data and maps are provided in Appendix 7-4.

Waterbird Distribution Survey

There were four records of purple sandpiper during waterbird distribution surveys within an 8km radius of the wind farm. Birds were foraging on the shoreline over 4km north of the wind farm. The maximum count was 43 birds.

7.3.7.29 Razorbill

Razorbill was recorded during the passage and winter season. Raw survey data and maps are provided in Appendix 7-4.

Waterbird Distribution Survey

There were four records of razorbill during waterbird distribution surveys within an 8km radius of the wind farm. Birds were swimming and flying in the sea on the coastline over 4km north of the wind farm. The maximum count was 29 birds.

7.3.7.30 Red Grouse

Red grouse was recorded during the wintering season and March. Raw survey data and maps are provided in Appendix 7-4.

Vantage Point Survey

Red grouse was recorded three times during vantage point surveys. Two birds were flying across a bog adjacent to the study area c.560m from the nearest turbine in October 2021 and a bird was heard calling in the same area in December 2021. A bird was also heard calling along the forestry edge south of the wind farm c.260m from the nearest turbine in March 2022.

Breeding Red Grouse Survey

There were five records of red grouse during dedicated red grouse surveys within 500m of the wind farm in March 2022. Single male grouse were recorded calling back and flying towards the surveyor in response to the tape lure call. All records were from an area of bog to the west of the wind farm boundary (separated by the Dunneill River), within c.420m of the nearest turbine.

Incidental Records

There were 11 incidental records of red grouse over the survey period, between November 2021 and March 2022. Individual birds were calling and flying in bog, and two individuals were flushed in Easky Bog in February. Droppings were also found in Easky Bog in March. All records were in bog adjacent to the wind farm site, within c.1.1km of the turbines.

7.3.7.31 Redwing

Redwing was recorded during the winter season. Raw survey data are provided in Appendix 7-4.

Vantage Point Survey

Redwing were observed during vantage point surveys on four occasions in October and November 2021. Flock size ranged from 1-15 birds. Birds were using bog, improved grassland and forestry.

Walkover Survey

There was a single record of redwing during winter walkover surveys. A single bird was recorded calling, flying and perching on a treeline in November 2021.

Incidental Records

There was a further two incidental records of redwing over the survey period. Birds were observed flying in bog and grassland in November 2021. The maximum flock size was ten birds.

7.3.7.32 Shoveler

Shoveler was recorded during the winter season. Raw survey data and maps are provided in Appendix 7-4.

Waterbird Distribution Survey

Shoveler was recorded once during waterbird distribution surveys within an 8km radius of the wind farm. A flock of nine birds were observed foraging on a lake at Screen Beg in January 2022, over 7km northeast of the study area.

7.3.7.33 Snipe

Snipe was recorded during the breeding and winter season. Raw survey data and maps are provided in Appendix 7-4.

Vantage Point Survey

There were 22 records of snipe during vantage point surveys; 16 flights and 6 non-flights. Of these, one was 150-200m from the turbines. The remainder were within a bog adjacent to the study area, over 200m from the turbines. Birds were flying and calling in bog and grassland, with a maximum count of four.

Walkover Survey

Snipe was recorded once during winter walkover surveys. A single bird was flushed from a bog adjacent to the study area by the surveyor in November 2021, c.410m from the nearest turbine.

Waterbird Distribution Survey

There were 31 records of snipe during waterbird distribution surveys within an 8km radius of the wind farm. Birds were flushed, flying and calling in bog and grassland throughout the hinterland; the nearest record was c.1.2km from the wind farm. The maximum count was 51 birds.

Incidental Records

In addition, there were 32 incidental records of snipe over the survey period. Birds were flushed and heard calling and chipping in bog adjacent to the wind farm (observations within 400m of the nearest turbine). A snipe was also drumming at Lough Minna in March 2022. The maximum count was six birds.

7.3.7.34 Swift

Swift was recorded during the mid-breeding season. Raw survey data are provided in Appendix 7-4.

Vantage Point Survey

Swift were observed during vantage point surveys on two occasions in June and July 2021. Flock size ranged from 2-16 birds. Birds were feeding over bog, improved grassland and scrub.

7.3.7.35 Whinchat

Whinchat was recorded during the breeding season. Raw survey data are provided in Appendix 7-4.

Incidental Records

There was one incidental record of whinchat over the survey period. A bird was observed in Cloghabracka to the north of the wind farm in July 2021. No breeding behaviour was recorded.

7.3.7.36 Woodcock

Woodcock was recorded during the breeding season. Raw survey data and maps are provided in Appendix 7-4.

Breeding Woodcock Survey

There were two records of woodcock during breeding woodcock surveys. A roding male was observed displaying and calling in open corridors within conifer forestry in late May (c.580m from the nearest turbine) and early June 2021 (c.1.2km from the nearest turbine).

7.3.7.37 Yellowhammer

Yellowhammer was recorded during the mid–breeding season. Raw survey data are provided in Appendix 7-4.

Vantage Point Survey

Yellowhammer was observed once during vantage point surveys in the study area in July 2021. A single bird was calling from scrub.

7.3.7.38 Buzzard

Buzzard was observed in the breeding and wintering season. Raw survey data and maps are provided in Appendix 7-4.

Vantage Point Survey

There were 28 records of buzzard during vantage point surveys; 22 flights and 6 non-flight. Of the records, five (18%) were 0-50m from the turbines, 13 (46%) were 50-100m from the turbines, three (11%) were 100-150m from the turbines, two (7%) were 150-200m from the turbines, four (14%) were 200-500m from the turbines and one (4%) was over 500m from the turbines. Pairs were observed soaring c.50m from the nearest turbines and soaring high over the turbine area. Birds were recorded foraging on the ground and preening within 100m of the turbines, and recorded descending into forestry and perched on fenceposts within the vicinity of the turbines.

Breeding Raptor Survey

Buzzard were recorded 13 times during breeding raptor surveys, including probable breeding records. Single birds and pairs were observed soaring over farmland between April and July 2021. Observations were within a c.2km radius of the wind farm, and birds were also observed hunting within 50m of the turbines on one occasion.

Walkover Survey

There were six observations of buzzard during breeding walkover surveys, including possible breeding records. Single birds were observed soaring and circling over woodland and grassland and a pair was hunting together in April 2021.

There were seven records of buzzard during winter walkover surveys. Up to two birds were seen flying over forestry and foraging on the ground in fields.

Of the total 13 records, eight (62%) were 50-100m from the turbines, two (15%) were 100-150m from the turbines, one (8%) was 150-200m from the turbines, one (8%) was 200-500m from the turbines and one (8%) was over 500m from the turbines.

Incidental Records

There were 16 incidental records of buzzard during the survey period. Birds were soaring, flying and hunting over forestry and farmland, and up to three individuals were seen. A pair were seen circling over forestry within 500m of the study area and were possibly roosting or nesting there. Of the records, one (6%) was 0-50m from the turbines, one (6%) was 50-100m from the turbines, one (6%) was 100-150m from the turbines and one (6%) was 150-200m from the turbines. The remaining records were over 200m from the turbines (these occurred during waterbird distribution surveys conducted within an 8km radius around the wind farm).

7.3.7.39 Sparrowhawk

Sparrowhawk was recorded during the breeding and wintering season. Raw survey data and maps are provided in Appendix 7-4.

Vantage Point Survey

During vantage point surveys, there were six sparrowhawk flights. Of the flights, one (17%) was 0-50m from the turbines, two (33%) were 50-100m from the turbines, one (17%) was 100-150m from the turbines and two (33%) were 200-500m from the turbines. Birds were hunting prey in grassland within 50m of turbines.

Breeding Raptor Survey

Sparrowhawk were recorded three times during breeding raptor surveys. Single birds were observed flying through suitable breeding habitat in farmland and woodland in April and July 2021 (possible breeding records). One observation was within 100m of the turbines and the remaining two were within a 2km radius of the wind farm.

Walkover Survey

Sparrowhawk was recorded once during winter walkover surveys. A lone bird was flying in the wind farm site in March 2022, c.55m from the nearest turbine.

Incidental Records

There were five incidental records of sparrowhawk over the survey period, between August and November 2021. Individual birds were observed flying within bog and farmland during surveys up to an 8km radius of the wind farm. Of these, one was within the wind farm.

7.3.8 Collision Monitoring Results

A total of two bird fatalities were discovered at the wind farm study area during the collision monitoring survey period. A corvid feather spot was recorded on grass 61m from Turbine 8 and a second corvid feather spot was recorded on grass 57m from Turbine 1, both in April 2021. These birds were likely hooded crows, rooks, jackdaws or ravens, which are all members of the corvid family with similar colouration. Because the true cause of death cannot be known, these fatalities are conservatively attributed to collision with turbine blades, as per Johnson (2003). It is noted that the monitoring surveys alone do not provide a total count of bird fatalities associated with a wind farm but do provide a representative sample of bird fatalities. It is of note that no corpses of KOR species were recorded (for a list of KORs refer to Section 7.4.2).

During the searcher efficiency trials, eight of the ten carcasses were retrieved by the dog, indicating a searcher efficiency of 88.9%. The scavenger removal rate was determined to be high: the median predation period occurred 2.33 days after the carcass was laid.

To estimate the total count of bird fatalities, the carcass returns, along with the results of searcher efficiency and carcass removal trials, were used to calculate the collision rates for the entire wind farm using Evidence of Absence software (EoA, version 2.0; US Fish and Wildlife Service). The results predict, with a 90% credibility level, that no more than 46 bird fatalities occurred during the survey period. This equates to no more than 3.5 birds per turbine per year, or no more than 4.14 bird fatalities per megawatt per year.

7.4 Receptor Evaluation

7.4.1 Determination of Population Importance

A determination of population importance for birds within the likely ZOI is provided below, following criteria described in Section 7.2.6. Estimates of national population sizes were obtained from the most recent species-specific national survey, or national surveys by Burke *et al.* (2018) and Lewis *et al.* (2019), or NPWS Article 12 Reporting (2008-2012), depending on what literature was available. Estimates for mean county population sizes were obtained from species-specific surveys, a review of I-WeBS sites in County Sligo or derived from national estimates, according to what literature was available.

Following NRA (2009), a population of National Importance is a regularly occurring population that exceeds 1% of the national population. Similarly, a population of County Importance is a regularly occurring population that exceeds 1% of the county population. Locally Important (Higher Value) populations are resident or regularly occurring species of conservation concern of importance at the local level, while Locally Important (Lower Value) populations are resident or regularly occurring species of some local importance.

7.4.1.1 Barnacle Goose

The national population of barnacle goose is estimated to be 16,273 birds (2018 National Census; Doyle *et al.,* 2018) and the county population is estimated to be 1,960 birds (IWeBS mean count for the period 2015/16 – 2019/20). Therefore, as per NRA (2009), a regularly occurring population of 162 birds is required for classification as National Importance and of 20 birds for classification as County Importance.

This species was recorded once during the survey period, over 5km from the study area. Based on this low frequency of occurrence, there is **no regularly occurring population of ecological significance** using the study area.

7.4.1.2 Black-throated Diver

The national population of black-throated diver is estimated to be 18 birds (NPWS Article 12 Reporting) and the county population is estimated to be one bird (IWeBS mean count for the period 2015/16 – 2019/20). Therefore, as per NRA (2009), a regularly occurring population of one bird is required for classification as National Importance.

This species was infrequently observed within 8km of the wind farm study area during surveys. Furthermore, none of these observations were within 4km of the wind farm study area. Therefore, based on this low frequency of occurrence, there is **no regularly occurring population of ecological significance** using the study area.

7.4.1.3 Dunlin

Dunlin is an SCI of Ballysadare SPA, located 13.2km from the wind farm study area. The distance from this SPA to the wind farm study area is greater than the mean foraging distance of dunlin, 0.5km (SNH, 2016).

The national wintering population of dunlin is estimated to be 37,409 birds (Burke *et al.,* 2018) and the national breeding population is estimated to be 150 pairs (NPWS Article 12 Reporting). The county wintering population is estimated to be 1,311 birds (IWeBS mean count for the period 2015/16 – 2019/20). Therefore, as per NRA (2009), a regularly occurring population of 374 wintering birds or one breeding pair is required for classification as National Importance[1] and of 13 wintering birds for classification as County Importance.

During the winter season, dunlin were occasionally observed within 8km of the wind farm study area during surveys. However, there were no observations within 4km of the wind farm study area. Therefore, based on this low frequency of occurrence, there is **no regularly occurring population of ecological significance** using the study area during winter.

During the breeding season, single dunlin in breeding plumage and suitable breeding habitat were observed twice. Given the cryptic nature of this species, breeding dunlin are likely to be under-recorded. One observation was in a bog 500m from the study area. Thus, on a precautionary basis, dunlin recorded during surveys in the breeding season are considered to be a population of **National Importance**.

7.4.1.4 Golden Plover

The national wintering population of golden plover is estimated to be 80,707 birds (Burke *et al.,* 2018) and the county wintering population is estimated to be 153 birds (IWeBS mean count for the period 2015/16 – 2019/20). Therefore, as per NRA (2009), a regularly occurring population of 807 birds is required for classification as National Importance and of two birds for classification as County Importance.

This species was occasionally observed within 8km of the wind farm study area during surveys. However, there were no observations within 1.5km of the wind farm study area. Therefore, based on this low frequency of occurrence, there is **no regularly occurring population of ecological significance** using the study area.

7.4.1.5 Great Northern Diver

The national wintering population of great northern diver is estimated to be 2,128 birds (Burke *et al.,* 2018) and the county wintering population is estimated to be 46 birds (IWeBS mean count for the period 2015/16 – 2019/20). Therefore, as per NRA (2009), a regularly occurring population of 21 birds is required for classification as National Importance and of one bird for classification as County Importance.

This species was regularly recorded within 8km of the wind farm study area during surveys. However, the majority of records were on coastline over 4km north of the wind farm, with a single record in Easky Lough, 5km south of the wind farm. Therefore, based on this low frequency of occurrence and distance of these records from the wind farm site, there is **no regularly occurring population of ecological significance** using the study area.

7.4.1.6 Greenland White-fronted Goose

The national wintering population of Greenland white-fronted goose is estimated to be 10,418 birds (International Census of Greenland White-fronted Geese; Fox *et al.,* 2020) and the county wintering population is estimated to be 54 birds (IWeBS mean count for the period 2015/16 – 2019/20). Therefore, as per NRA (2009), a regularly occurring population of 104 birds is required for classification as National Importance and of one bird for classification as County Importance.

This species was recorded once during the survey period, over 7km from the study area. Based on this low frequency of occurrence and the distance of this record from the wind farm site, there is **no regularly occurring population of ecological significance** using the study area.

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[1] *As a single breeding pair is classified as of national importance it is not meaningful to discuss estimates of county importance.*

7.4.1.7 Hen Harrier

The national breeding population of hen harrier is estimated to be 108-157 pairs (2015 National Survey of Breeding Hen Harrier in Ireland; Ruddock *et al.,* 2016) and the national wintering population is estimated to be 269–349 birds (NPWS Article 12 Reporting). In the absence of more detailed county-level information, the county wintering population is estimated to be 10–13 birds, assuming an even spatial distribution across the 26 counties of Ireland covered by these data. Therefore, as per NRA (2009), and taking the conservative minimum value, a regularly occurring population of one breeding pair[2] or three wintering birds is required for classification as National Importance and of one wintering bird for classification as County Importance.

During the breeding season, there was a single observation of a lone hen harrier during surveys and no breeding behaviour was observed. Therefore there is **no regularly occurring breeding population of ecological significance** using the study area.

Hen harrier was occasionally observed hunting within 500m of the wind farm study area during the winter season. At least one individual bird was recorded. Thus, hen harrier recorded during surveys in the winter season are considered to be a population of **County Importance**.

7.4.1.8 Kingfisher

The national breeding population of kingfisher is estimated to be 368–1031 pairs (NPWS Article 12 Reporting). In the absence of more detailed county-level information, the county breeding population is estimated to be 14-40 pairs, assuming an even spatial distribution of pairs across the 26 counties of Ireland covered by these data. Therefore, as per NRA (2009), and taking the conservative minimum value, a regularly occurring breeding population of four pairs is required for classification as National Importance and of one pair for classification as County Importance. There are no estimates available for the national wintering kingfisher population due to survey constraints, although this species is believed to be widely distributed (Cummins *et al.,* 2010b). Similarly, IWeBS counts are generally too limited to provide an estimate for the county wintering population. Thus, in the absence of national and county population estimate, and following the precautionary principle, regular records of wintering kingfisher are treated as County Importance.

This species was recorded once during the survey period, over 4km from the study area. Based on this low frequency of occurrence, there is **no regularly occurring population of ecological significance** using the study area.

7.4.1.9 Mediterranean Gull

The national breeding population of Mediterranean gull is estimated to be 25 pairs (NPWS Article 12 Reporting). In the absence of more detailed county-level information, the county breeding population is estimated to be two pairs, assuming an even spatial distribution of pairs across the 16 coastal counties of Ireland covered by these data. Therefore, as per NRA (2009), a regularly occurring breeding population of one pair is required for classification as National Importance. There are no estimates available for the national wintering population. Similarly, IWeBS counts are generally too limited to provide an estimate for the county wintering population. Thus, in the absence of national and county population estimates, and following the precautionary principle, regular records of wintering Mediterranean gull are treated as County Importance.

This species was recorded once during surveys, 8km from the wind farm study area. Therefore, there is **no regularly occurring population of ecological significance** using the study area.

[2] *As a single breeding pair is classified as of national importance it is not meaningful to discuss estimates of county importance.*

7.4.1.10 Merlin

The national breeding population of merlin is estimated to be 200-400 pairs (NPWS Article 12 Reporting). In the absence of more detailed county-level information, the county breeding population is estimated to be 8-16 pairs, assuming an even spatial distribution of pairs across the 26 counties of Ireland covered by these data. Therefore, as per NRA (2009), a regularly occurring breeding population of two pairs is required for classification as National Importance and of one pair for classification as County Importance. There are no estimates available for the national or county wintering population. Thus, in the absence of national and county population estimate, and following the precautionary principle, regular records of wintering merlin are treated as County Importance.

This species was frequently recorded within a 2km radius of the wind farm study area during surveys, including observations within 500m of the wind farm study area. Single birds were observed in suitable breeding habitat throughout the breeding season, and hunting during the winter season. A nest was located by MKO surveyors in May 2022 at Easky Lough. Thus, merlin recorded during surveys are considered to be a population of **County Importance**.

7.4.1.11 Peregrine

The national breeding population of peregrine is estimated to be 425 pairs (National Breeding Peregrine Survey 2017). In the absence of more detailed county-level information, the county breeding population is estimated to be 16 pairs, assuming an even spatial distribution of pairs across the 26 counties of Ireland covered by these data. Therefore, as per NRA (2009), a regularly occurring breeding population of four pairs is required for classification as National Importance and of one pair for classification as County Importance. There are no estimates available for the national or county wintering population. Thus, in the absence of national and county population estimate, and following the precautionary principle, regular records of wintering peregrine are treated as County Importance.

This species was recorded twice during surveys. Furthermore, there were no observations within 5km of the wind farm study area. Therefore, based on this low frequency of occurrence, there is **no regularly occurring population of ecological significance** using the study area.

7.4.1.12 Red Kite

The most recent estimate for the national breeding population of red kite is 17 pairs (NPWS Article 12 Reporting). Therefore, as per NRA (2009), a regularly occurring population of one breeding pair is required for classification as National Importance. There are no estimates available for the national or county wintering population. Thus, in the absence of national and county population estimate, and following the precautionary principle, regular records of wintering red kite are treated as County Importance.

This species was observed once during the winter season, 8km from the wind farm study area. Therefore, based on this low frequency of occurrence, there is **no regularly occurring population of ecological significance** using the study area.

7.4.1.13 Red-throated Diver

The national wintering population of red-throated diver is estimated to be 657 birds (Burke *et al.,* 2018) and the county wintering population is estimated to be 14 birds (IWeBS mean count for the period 2015/16 – 2019/20). Therefore, as per NRA (2009), a regularly occurring population of seven birds is required for classification as National Importance and of one bird for classification as County Importance.

During surveys in the winter and passage season, red-throated diver were occasionally observed on the coastline within 8km of the wind farm, and once on Easky Lough, 5km south of the wind farm. However, there were no observations within 4km of the wind farm. Furthermore, there are no waterbodies providing suitable habitat within the wind farm. Therefore, based on this low frequency of occurrence and the distance of these records from the wind farm site, there is **no regularly occurring population of ecological significance** using the study area.

7.4.1.14 Storm Petrel

The national breeding population of storm petrel is estimated to be 99,056 pairs (Mitchell *et al.,* 2004). Therefore, as per NRA (2009), a regularly occurring population of 990 birds is required for classification as Nationally Important. Data for county population sizes are unavailable.

This species was recorded once during surveys, off the coast, 8km from the wind farm, during the passage season. Furthermore, there is no suitable habitat within the study area, as this species is strictly marine and coastal. Therefore, there is **no regularly occurring population of ecological significance** using the study area.

7.4.1.15 Whooper Swan

The national population of whooper swan is estimated to be 14,467 birds (Burke *et al.,* 2021) and the county population is estimated to be 273 birds (Burke *et al.,* 2021). Therefore, as per NRA (2009), a regularly occurring population of 145 birds is required for classification as National Importance and of three birds for classification as County Importance.

Whooper swan were regularly recorded in the hinterland of the wind farm study area during surveys, including flocks up to 15 birds (County Importance). However, there were no records of whooper swan within 500m of the study area. Thus, there is considered to be **no regularly occurring population of ecological significance** using the study area.

7.4.1.16 Brent Goose

Brent goose is an SCI of Ballysadare SPA, located 13.2km from the wind farm study area. The distance from this SPA to the wind farm study area is greater than the mean foraging distance of brent goose, 6.1km (Summers and Critchley, 1990).

The all-Ireland (i.e. national and Northern Ireland) population of brent goose is estimated to be 35,150 birds (Burke *et al.,* 2018) and the county population is estimated to be 1,226 birds (IWeBS mean count for the period 2015/16 – 2019/20). Therefore, as per NRA (2009), a regularly occurring population of 352 birds is required for classification as National Importance and of 12 birds for classification as County Importance.

Brent goose were regularly recorded on the coastline within an 8km radius of the wind farm study area, including flocks up to 43 birds (County Importance). On one occasion, a lone brent goose was observed flying within 500m of the wind farm. However, based on the low frequency of observations within 500m of the wind farm, there is considered to be **no regularly occurring population of ecological significance** using the study area.

7.4.1.17 Kittiwake

Kittiwake is an SCI of Aughris Head SPA, located 7.8km from the wind farm study area. This species is strictly marine and is not dependent on habitats near or within the study area.

The national breeding population of kittiwake is estimated to be 28,627 birds (NPWS Article 12 Reporting). Therefore, as per NRA (2009), a regularly occurring population of 286 birds is required for classification as National Importance. Data for county population sizes are unavailable. During winter, kittiwake disperse to sea.

Kittiwake were occasionally recorded off the coastline within an 8km radius of the wind farm during the passage and winter season. There is no suitable habitat within the study area, as this species is strictly marine and coastal. Therefore, there is **no regularly occurring population of ecological significance** using the study area.

7.4.1.18 Redshank

Redshank is an SCI of Ballysadare SPA, located 13.2km from the wind farm study area. Redshank tends to use estuarine, coastal and wetland habitats and, based on the location of records during surveys, are unlikely to be dependent on habitats near or within the study area.

The national wintering population of redshank is estimated to be 16,812 birds (Burke *et al.,* 2018) and the county wintering population is estimated to be 769 birds (IWeBS mean count for the period 2015/16 – 2019/20). Therefore, as per NRA (2009), a regularly occurring population of 168 birds is required for classification as National Importance and of eight birds for classification as County Importance.

Redshank was regularly observed on the coastline within an 8km radius of the wind farm during the post-breeding and winter season and on one occasion at a lake 4km south of the wind farm, with a maximum count of 34 birds (County Importance). However, there were no observations within 4km of the wind farm study area. Therefore, there is **no regularly occurring population of ecological significance** using the study area.

7.4.1.19 Curlew

The national wintering population of curlew is estimated to be 28,300 birds (Burke *et al.,* 2018) and the county wintering population is estimated to be 1,257 birds (IWeBS mean count for the period 2015/16 – 2019/20). Therefore, as per NRA (2009), a regularly occurring population of 283 birds is required for classification as National Importance and 13 birds for classification as County Importance.

Curlew was regularly observed on the coastline within an 8km radius of the wind farm during the post-breeding and winter season, with a maximum count of 23 birds (County Importance). However, there were no observations within 3.5km of the wind farm study area. Therefore, there is **no regularly occurring population of ecological significance** using the study area.

7.4.1.20 Eider

The national wintering population of eider is estimated to be 1,373 birds (Burke *et al.,* 2018) and the county wintering population is estimated to be 55 birds (IWeBS mean count for the period 2015/16 – 2019/20). Therefore, as per NRA (2009), a regularly occurring population of 13 birds is required for classification as National Importance and of one bird for classification as County Importance.

Eider was occasionally recorded on the coastline within an 8km radius of the wind farm during the winter season, with up to 20 birds counted (National Importance). However, there were no observations within 5km of the study area and, furthermore, there is no suitable habitat within the study area, as this species is strictly coastal. Therefore, there is **no regularly occurring population of ecological significance** using the study area.

7.4.1.21 Grey Wagtail

The national population of grey wagtail is estimated to be 50,786 birds (Lewis *et al.,* 2019). In the absence of more detailed county-level information, the county population is estimated to be 1,953 birds, assuming an even spatial distribution of pairs across the 26 counties of Ireland covered by these data. Therefore, as per NRA (2009), a regularly occurring population of 508 birds is required for classification as National Importance and of 20 birds for classification as County Importance.

This species was occasionally observed during the survey period, including within the study area, and is likely to be under-recorded due to its ecology and preferred habitats. Probable breeding pairs were also observed. Thus, given that this is a widespread species (national population of 50,786), grey wagtail recorded during surveys are considered to be a population of **Local Importance (Lower Value).**

7.4.1.22 Kestrel

The national population of kestrel is estimated to be 13,500 birds (Lewis *et al.,* 2019). In the absence of more detailed county-level information, the county population is estimated to be 519 birds, assuming an even spatial distribution of birds across the 26 counties of Ireland covered by these data. Therefore, as per NRA (2009), a regularly occurring population of 135 birds is required for classification as National Importance and of five birds for classification as County Importance.

Kestrel was regularly observed within the wind farm study area and surrounds during the breeding and wintering season. Birds were hunting within the wind farm and displaying pairs were observed within 2km of the wind farm, along with a bird carrying prey north of the wind farm. It is likely there are 1-2 territories in the vicinity of the wind farm. As such, kestrel recorded during surveys are considered to be a population of **Local Importance (Higher Value).**

7.4.1.23 Knot

The national wintering population of knot is estimated to be 13,752 birds (Burke *et al.,* 2019) and the county wintering population is estimated to be 398 birds (IWeBS mean count for the period 2015/16 – 2019/20). Therefore, as per NRA (2009), a regularly occurring population of 138 birds is required for classification as National Importance and of four birds for classification as County Importance.

This species was recorded twice on the coastline 4km from the wind farm during the winter season, with a maximum count of two birds. Based on this low frequency of occurrence, there is **no regularly occurring population of ecological significance** using the study area.

7.4.1.24 Lapwing

The national wintering population of lapwing is estimated to be 69,823 birds (Burke *et al.,* 2019) and the county wintering population is estimated to be 467 birds (IWeBS mean count for the period 2015/16 – 2019/20). Therefore, as per NRA (2009), a regularly occurring population of 698 birds is required for classification as National Importance and of five birds for classification as County Importance.

Lapwing were regularly recorded in the hinterland of the wind farm during surveys within an 8km radius of the study area during the post-breeding and winter season, including flocks of up to 45 birds (County Importance). On one occasion, a small flock was observed flying within 500m of the wind farm. However, due to the low frequency of occurrence within the study area, there is considered to be **no regularly occurring population of ecological significance** using the study area.

7.4.1.25 Long-tailed Duck

The national population of long-tailed duck is estimated to be 40 birds (NPWS Article 12 Reporting). In the absence of more detailed county-level information, the county population is estimated to be three birds, assuming an even spatial distribution of pairs across the 16 coastal counties of Ireland covered by these data. Therefore, as per NRA (2009), a regularly occurring population of one bird is required for classification as National Importance.

This species was recorded once during the survey period, over 8km from the study area. Based on this low frequency of occurrence, there is **no regularly occurring population of ecological significance** using the study area.

7.4.1.26 Meadow Pipit

The national population of meadow pipit is estimated to be 1,351,995 birds (Lewis *et al.,* 2019). In the absence of more detailed county-level information, the county population is estimated to be 52,000 birds, assuming an even spatial distribution of pairs across the 26 counties of Ireland covered by these data. Therefore, as per NRA (2009), a regularly occurring population of 13,520 birds is required for classification as National Importance and of 520 birds for classification as County Importance.

Meadow pipit was abundant within the study area and surroundings. Birds were foraging and displaying. Thus, given that this is a widespread species (national population of 1,351,995), meadow pipit recorded during surveys are considered to be a population of **Local Importance (Lower Value).**

7.4.1.27 Oystercatcher

The national wintering population of oystercatcher is estimated to be 42,875 birds (Burke *et al.,* 2019) and the county wintering population is estimated to be 1,847 birds (IWeBS mean count for the period 2015/16 – 2019/20). Therefore, as per NRA (2009), a regularly occurring population of 429 birds is required for classification as National Importance and of 19 birds for classification as County Importance.

Oystercatcher was very regularly observed along the coastline within an 8km radius of the wind farm study area, with a maximum count of 41 birds (County Importance). However, there were no observations within 4km of the study area and, furthermore, there is no suitable habitat within the study area, as this species is strictly coastal. Therefore, there is **no regularly occurring population of ecological significance** using the study area.

7.4.1.28 Purple Sandpiper

The national wintering population of purple sandpiper is estimated to be 465 birds (Burke *et al.,* 2019). In the absence of more detailed county-level information, the county wintering population is estimated to be 29 birds, assuming an even spatial distribution of pairs across the 16 coastal counties of Ireland covered by these data. Therefore, as per NRA (2009), a regularly occurring population of five birds is required for classification as National Importance and of one bird for classification as County Importance.

This species was occasionally recorded along coastline within an 8km radius of the wind farm study area, with a maximum count of 43 birds (National Importance). However, there were no observations within 4km of the study area and, furthermore, there is no suitable habitat within the study area, as this species is strictly coastal. Therefore, there is **no regularly occurring population of ecological significance** using the study area.

7.4.1.29 Razorbill

The national population of razorbill is estimated to be 25,525 birds (NPWS Article 12 Reporting). In the absence of more detailed county-level information, the county population is estimated to be 1,595 birds, assuming an even spatial distribution of pairs across the 16 coastal counties of Ireland covered by these data. Therefore, as per NRA (2009), a regularly occurring population of 255 birds is required for classification as National Importance and of 16 birds for classification as County Importance.

This species was occasionally recorded along coastline within an 8km radius of the wind farm study area, with a maximum count of 29 birds (County Importance). However, there were no observations within 4km of the study area and, furthermore, there is no suitable habitat within the study area, as this species is strictly coastal and marine. Therefore, there is **no regularly occurring population of ecological significance** using the study area.

7.4.1.30 Red Grouse

The national population of red grouse is estimated to be 4,200 birds (Cummins *et al.,* 2010a). In the absence of more detailed county-level information, the county population is estimated to be 162 birds, assuming an even spatial distribution of pairs across the 26 counties of Ireland covered by these data. Therefore, as per NRA (2009), a regularly occurring population of 42 birds is required for classification as National Importance and of two birds for classification as County Importance.

Red grouse was regularly observed within the 500m of the wind farm study area and surrounds during the winter season and in March (this species' breeding period). Birds were flying and calling within the wind farm and adjacent bog. A minimum of two individuals were observed (County Importance). Thus, red grouse recorded during surveys are considered to be a population of **County Importance.**

7.4.1.31 Redwing

Population estimates for redwing in Ireland are currently not available. However, the estimate for Europe is 26,300,000, while the global estimate is 98,000,000 (BirdLife International).

This species was occasionally observed during the survey period, including records within the study area. Birds were foraging and flying, with a maximum count of 15. Thus, given that this is a widespread species, redwing recorded during surveys are considered to be a population of **Local Importance (Lower Value).**

7.4.1.32 Shoveler

The national wintering population of shoveler is estimated to be 1,865 birds (Burke *et al.,* 2019) and the county wintering population is estimated to be 14 birds (IWeBS mean count for the period 2015/16 – 2019/20). Therefore, as per NRA (2009), a regularly occurring population of 19 birds is required for classification as National Importance and of one bird for classification as County Importance.

This species was recorded once during the survey period, over 7km from the study area. Based on this low frequency of occurrence, there is **no regularly occurring population of ecological significance** using the study area.

7.4.1.33 Snipe

The national population of snipe is estimated to be 4,275 breeding pairs (NPWS Article 12 Reporting). In the absence of more detailed county-level information, the county population is estimated to be 164 birds, assuming an even spatial distribution of pairs across the 26 counties of Ireland covered by these data. Therefore, as per NRA (2009), a regularly occurring population of 43 birds is required for classification as National Importance and of two birds for classification as County Importance.

This species was very frequently observed during the survey period; generally in bog adjacent to the study area, but occasionally within 500m of the wind farm, with a maximum count of six (County Importance). Breeding 'drumming' displays were recorded adjacent to the wind farm. Thus, snipe recorded during surveys are considered to be a population of **County Importance.**

7.4.1.34 Swift

The national population of swift is estimated to be 51,728 birds (Lewis *et al.,* 2019). In the absence of more detailed county-level information, the county population is estimated to be 1,990 birds, assuming an even spatial distribution of pairs across the 26 counties of Ireland covered by these data. Therefore, as per NRA (2009), a regularly occurring population of 517 birds is required for classification as National Importance and of 20 birds for classification as County Importance.

This species was observed twice during the survey period within 500m of the study area. Given the low frequency of observations within 500m of the study area, and that this species is generally readily observable when present, there is likely **no regularly occurring population of ecological significance** using the study area.

7.4.1.35 Whinchat

The national population of whinchat is estimated to be 150 pairs birds (NPWS Article 12 Reporting) and its range in Ireland is mostly restricted to areas of the Shannon Callows, Kildare and Wicklow. As per NRA (2009), a regularly occurring population of two birds is required for classification as National Importance.

This species was recorded once during the survey period, over 500m from the study area. Based on this low frequency of occurrence, there is **no regularly occurring population of ecological significance** using the study area.

7.4.1.36 Woodcock

Population estimates for woodcock in Ireland are currently not available. However, the estimate for Europe is 13,800,000 mature individuals, while the global estimate is 10,000,000-26,000,000 birds (BirdLife International).

There were two records of woodcock during the survey period in forestry adjacent to the study area. However, no woodcock were recorded within 500m of the study area during any survey, including dedicated woodcock surveys throughout forestry in the wind farm. Thus, there is likely **no regularly occurring population of ecological significance** using the study area.

7.4.1.37 Yellowhammer

The national population of yellowhammer is estimated to be 217,252 (Lewis *et al.,* 2019). In the absence of more detailed county-level information, the county population is estimated to be 8,356 birds, assuming an even spatial distribution of pairs across the 26 counties of Ireland covered by these data. Therefore, as per NRA (2009), a regularly occurring population of 2,172 birds is required for classification as National Importance and of 84 birds for classification as County Importance.

This species was observed once during the survey period within 500m of the study area. Given the low frequency of observations within 500m of the study area, and that this species is generally readily observable when present, there is likely **no regularly occurring population of ecological significance** using the study area.

7.4.1.38 Buzzard

The national population of buzzard is estimated to be 1,500 breeding pairs (NPWS Article 12 Reporting). Buzzard is not an SCI of an SPA within 15km of the study area, nor listed on Annex I, and is a Green Listed BoCCI species, indicating it is of lower conservation priority.

Buzzard was regularly observed within the wind farm study area and surrounds during the breeding and wintering season, throughout the study period. Birds were hunting and a pair was observed within the wind farm. It is likely there is a territory in the vicinity of the wind farm. On a precautionary basis, buzzard recorded during surveys are considered to be a population of **Local Importance (Higher Value).**

7.4.1.39 Sparrowhawk

The national population of sparrowhawk is estimated to be 9,100 breeding pairs (NPWS Article 12 Reporting). Sparrowhawk is not an SCI of an SPA within 15km of the study area, nor listed on Annex I, and is a Green Listed BoCCI species, indicating it is of lower conservation priority.

Sparrowhawk was regularly observed within the wind farm study area and surrounds during the breeding and wintering season, throughout the study period. Birds were hunting and a pair was observed within the wind farm. Possible breeding activity was noted during dedicated breeding raptor surveys. On a precautionary basis, sparrowhawk recorded during surveys are considered to be a population of **Local Importance (Higher Value).**

7.4.2 Identification of Key Ornithological Receptors

Table 7-11 outlines the rationale for including or excluding each target species recorded during field surveys as a KOR. The conservation status, population importance evaluation in the study area following NRA (2009) and a detailed explanation for inclusion/exclusion as a KOR is provided. The sensitivity of species included as KORs is then evaluated in the following section.

Table 7-11 Receptor evaluation and selection criteria rational

Species	Conservation Status	NRA Evaluation	Rationale for inclusion/exclusion as KOR	KOR
Barnacle Goose	Annex I Birds Directive & Section 19 Wildlife Acts 1976-2021	**Wintering** No population of ecological significance recorded	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**
Black-throated Diver	Annex I Birds Directive & Section 19 Wildlife Acts 1976-2021	**Wintering** No population of ecological significance recorded	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**
Dunlin	SCI of Ballysadare Bay & Annex I Birds Directive & Red List & Section 19 Wildlife Acts 1976-2021	**Breeding** National Importance	During the breeding season, possible breeding dunlin were observed approximately 500m from the wind farm study area and are considered to be a population of National Importance. The potential for displacement and collision risk cannot be excluded. As such, an assessment for displacement and collision risk is required for breeding dunlin.	**Yes**

Species	Conservation Status	NRA Evaluation	Rationale for inclusion/exclusion as KOR	KOR
		Wintering No population of ecological significance	During the winter season, no wintering dunlin population of ecological significance was recorded during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to wintering dunlin.	**No**
Golden Plover	Annex I Birds Directive & Red List & Section 19 Wildlife Acts 1976-2021	**Passage and Wintering** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**
Great Northern Diver	Annex I Birds Directive & Section 19 Wildlife Acts 1976-2021	**Passage and Wintering** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**
Greenland White-fronted Goose	Annex I Birds Directive & Section 19 Wildlife Acts 1976-2021	**Wintering** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**

Species	Conservation Status	NRA Evaluation	Rationale for inclusion/exclusion as KOR	KOR
Hen Harrier	Annex I Birds Directive & Schedule 4 and Section 19 Wildlife Acts 1976-2021	**Wintering** County Importance	During the winter season, hen harrier were observed hunting within 500m of the wind farm study area, and are considered to be a population of County Importance. The potential for displacement and collision risk cannot be excluded. As such, an assessment for displacement and collision risk is required for wintering hen harrier.	**Yes**
		Breeding No population of ecological significance	During the breeding season, no hen harrier population of ecological significance was recorded during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to breeding hen harrier.	**No**
Kingfisher	Annex I Birds Directive & Section 19 Wildlife Acts 1976-2021	**Wintering** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**
Mediterranean Gull	Annex I Birds Directive & Section 19 Wildlife Acts 1976-2021	**Wintering** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**

Species	Conservation Status	NRA Evaluation	Rationale for inclusion/exclusion as KOR	KOR
Merlin	Annex I Birds Directive & Schedule 4 and Section 19 Wildlife Acts 1976-2021	**All Seasons** County Importance	Merlin were recorded flying through and utilising habitats within 500m of the wind farm study area during the winter and breeding seasons, and are considered to be a population of County Importance. A nest was also identified at Easky Lough by MKO surveyors in May 2022. The potential for displacement and collision risk cannot be excluded. As such, an assessment for displacement and collision risk is required for merlin.	**Yes**
Peregrine	Annex I Birds Directive & Schedule 4 and Section 19 Wildlife Acts 1976-2021	**Wintering** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**
Red Kite	Annex I Birds Directive & Red List & Schedule 4 and Section 19 Wildlife Acts 1976-2021	**Wintering** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**
Red-throated Diver	Annex I Birds Directive & Section 19 Wildlife Acts 1976-2021	**Passage and Wintering** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**

Species	Conservation Status	NRA Evaluation	Rationale for inclusion/exclusion as KOR	KOR
Storm Petrel	Annex I Birds Directive & Section 19 Wildlife Acts 1976-2021	**Passage** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**
Whooper Swan	Annex I Birds Directive & Section 19 Wildlife Acts 1976-2021	**Wintering** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**
Brent Goose	SCI of Ballysadare Bay & Section 19 Wildlife Acts 1976-2021	**Wintering** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**
Kittiwake	SCI of Aughris Head & Section 19 Wildlife Acts 1976-2021	**Passage and Wintering** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**
Redshank	SCI of Ballysadare Bay & Section 19 Wildlife Acts 1976-2021	**Wintering** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**

Species	Conservation Status	NRA Evaluation	Rationale for inclusion/exclusion as KOR	KOR
Curlew	Red List & Section 19 Wildlife Acts 1976-2021	**Wintering** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**
Eider	Red List & Section 19 Wildlife Acts 1976-2021	**Wintering** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**
Grey Wagtail	Red List & Section 19 Wildlife Acts 1976-2021	**All Seasons** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**
Kestrel	Red List & Schedule 4 and Section 19 Wildlife Acts 1976-2021	**All Seasons** Local Importance (Higher Value)	During the breeding and winter season, kestrel were observed hunting within the wind farm and breeding activity was observed within 2km of the wind farm, and are considered to be a population of Local Importance (Higher Value). The potential for displacement and collision risk cannot be excluded. As such, an assessment for displacement and collision risk is required for kestrel.	**Yes**
Knot	Red List & Section 19 Wildlife Acts 1976-2021	**Wintering** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**

Species	Conservation Status	NRA Evaluation	Rationale for inclusion/exclusion as KOR	KOR
Lapwing	Red List & Section 19 Wildlife Acts 1976-2021	**<u>Wintering</u>** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**
Long-tailed Duck	Red List & Section 19 Wildlife Acts 1976-2021	**<u>Wintering</u>** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**
Meadow Pipit	Red List & Section 19 Wildlife Acts 1976-2021	**<u>All Seasons/</u>** Local Importance (Lower Value)	A population of Local Importance (Lower Value) are considered to use the study area. However, as per NatureScot guidance, it is generally considered that passerine bird species (including meadow pipit) are not significantly impacted by wind farms due to their ecology. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development will significantly impact this species.	**No**
Oystercatcher	Red List & Section 19 Wildlife Acts 1976-2021	**<u>Passage and Wintering</u>** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**

Species	Conservation Status	NRA Evaluation	Rationale for inclusion/exclusion as KOR	KOR
Purple Sandpiper	Red List & Section 19 Wildlife Acts 1976-2021	**Wintering** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**
Razorbill	Red List & Section 19 Wildlife Acts 1976-2021	**Passage and Wintering** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**
Red Grouse	Red List & Section 19 Wildlife Acts 1976-2021	**Wintering and March** County Importance	Red grouse were recorded utilising habitats within 500m of the wind farm study area during the winter and early breeding season and are considered to be a population of County Importance. The potential for displacement and collision risk cannot be excluded. As such, an assessment for displacement and collision risk is required for red grouse.	**Yes**
Redwing	Red List & Section 19 Wildlife Acts 1976-2021	**Wintering** Local Importance (Lower Value)	A population of Local Importance (Lower Value) are considered to use the study area. However, as per NatureScot guidance, it is generally considered that passerine bird species (including redwing) are not significantly impacted by wind farms due to their ecology. As such, the potential for direct habitat loss, displacement and collision risk is limited and there is no evidence to suggest that the development site is of significance to this species.	**No**

Species	Conservation Status	NRA Evaluation	Rationale for inclusion/exclusion as KOR	KOR
Shoveler	Red List & Section 19 Wildlife Acts 1976-2021	**Wintering** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**
Snipe	Red List & Section 19 Wildlife Acts 1976-2021	**All Seasons** County Importance	Snipe were recorded utilising habitats within 500m of the wind farm study area during the winter and breeding seasons, and are considered to be a population of County Importance. The potential for displacement and collision risk cannot be excluded. As such, an assessment for displacement and collision risk is required for snipe.	**Yes**
Swift	Red List & Section 19 Wildlife Acts 1976-2021	**Breeding** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**
Whinchat	Red List & Section 19 Wildlife Acts 1976-2021	**Breeding** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**
Woodcock	Red List & Section 19 Wildlife Acts 1976-2021	**Breeding** Local Importance (Higher Value)	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**

Species	Conservation Status	NRA Evaluation	Rationale for inclusion/exclusion as KOR	KOR
Yellowhammer	Red List & Section 19 Wildlife Acts 1976-2021	**Breeding** No population of ecological significance	No population of ecological significance was recorded utilising the study area during the extensive suite of surveys conducted. As such, the potential for direct habitat loss, displacement and collision risk are limited and there is no evidence to suggest that the development site is of significance to this species.	**No**
Buzzard	Schedule 4 and Section 19 Wildlife Acts 1976-2021	**All Seasons** Local Importance (Higher Value)	Buzzard were recorded utilising habitats within 500m of the wind farm study area and are considered to be a population of Local Importance (Higher Value). The potential for displacement and collision risk cannot be excluded. As such, an assessment for displacement and collision risk is required for buzzard.	**Yes**
Sparrowhawk	Schedule 4 and Section 19 Wildlife Acts 1976-2021	**All Seasons** Local Importance (Higher Value)	Sparrowhawk were recorded utilising habitats within 500m of the wind farm study area and are considered to be a population of Local Importance (Higher Value). The potential for displacement and collision risk cannot be excluded. As such, an assessment for displacement and collision risk is required for sparrowhawk.	**Yes**

7.4.3 Key Ornithological Receptor Sensitivity Determination

Criteria developed by Percival (2003) for assessing bird sensitivity within the study area is presented in Table 7-3 (Section 7.2.6). The sensitivity of the KORs, as per Percival (2003), are listed below, including the rationale for their respective sensitivity classification.

High Sensitivity KORs are:

- Dunlin (breeding season; nationally important population)
- Hen harrier (winter season; ecologically sensitive species)

Medium Sensitivity KORs are:

- Merlin (all seasons; Annex I)
- Kestrel (all seasons; Red List)
- Red Grouse (all seasons; Red List)
- Snipe (all seasons; Red List)

Low Sensitivity KORs are:

- Buzzard (all seasons; lower conservation concern)
- Sparrowhawk (all seasons; lower conservation concern)

7.4.4 Potential Impacts

All elements of the Proposed Development have been considered in assessing impacts on KORs. As this planning application relates to extension of the life of the existing wind farm, there will be no construction works, thus there is no assessment of construction phase impacts. This section is structured as follows:

- Assessment of impacts in relation to KORs during the extended operation period and decommissioning
- Assessment of 'Do nothing' effect
- Assessment of impacts on designated areas

7.4.5 Effects on Key Ornithological Receptors during Operation and Decommissioning

The following sections describe potential effects on KORs that may occur during the extended operation period and decommissioning of the wind farm. The magnitude and significance of these effects are then determined according to Percival (2003) and EPA (2022) criteria.

7.4.5.1 Dunlin (breeding season)

Potential effects during the operational and decommissioning phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Operational Phase			
Direct Habitat Loss	No habitat will be altered as part of the Proposed Development. Direct effects are not anticipated.	**No Effect**	**No Effect**

Potential effects during the operational and decommissioning phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Displacement and Barrier Effect	The majority of the habitat within the study area is mature commercial conifer forestry plantation, with smaller areas of agricultural pasture in the north. Neither conifer forestry nor agricultural pasture are used by breeding dunlin. Dunlin were recorded in bog adjacent to the wind farm, including one observation approximately 500m from the study area boundary. No dunlin were observed within the study area itself. A likely explanation for this is that the study area does not provide attractive breeding habitat for dunlin, whereas suitable open bog extends westward, providing a wide availability of attractive habitat in the surrounding area. Given the lack of observations and limited suitable habitat within the study area itself, no significant displacement or barrier effects are anticipated.	The magnitude of the effect is assessed as *Negligible*. The cross tablature of a *High* sensitivity species and *Negligible* impact corresponds to a ***Very Low*** effect significance.	**Likely medium-term constant not-significant negative effect**
Collision Risk	This species was not recorded within the wind farm study area during the extensive vantage point survey work undertaken. Furthermore, as previously outlined, the habitats of the wind farm site are unlikely to attract this species with any regularity. Given this absence from the wind farm site collision-related mortality is not likely to significantly impact this species and the predicted collision risk is negligible. In addition, it is noted that the collision monitoring surveys provide a representative sample of bird fatalities and no dunlin fatalities were recorded. No significant effects are anticipated.	The magnitude of the effect is assessed as *Negligible*. The cross tablature of a *High* sensitivity species and *Negligible* impact corresponds to a ***Very Low*** effect significance.	**Likely medium-term constant not-significant negative effect**

Potential effects during the operational and decommissioning phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Decommissioning Phase			
Direct Habitat Loss	Once the current planning permission expires (2024) the footprint of the development will revert to its original use as agricultural rough pasture, crops and commercial forestry. This will provide a slight increase in the availability of pasture, crop and forestry habitat locally. However, this will only result in a negligible increase in available habitat relative to its abundance in the wider surroundings. Furthermore, these habitats are not unique to the wind farm site or rare locally. Alternatively, if the operational life is extended (i.e. by c.15 years), a new less invasive decommissioning approach is proposed which would include removing infrastructure (e.g. turbines etc.) but leaving the narrow corridor of the onsite roads in situ. No significant effects are anticipated in either scenario.	The magnitude of the effect is assessed as *Negligible*. The cross tablature of a *High* sensitivity species and *Negligible* impact corresponds to a ***Very Low*** effect significance.	**Likely long-term constant non-significant positive effect**
Displacement	Dunlin were recorded in bog adjacent to the wind farm, including one observation approximately 500m from the study area boundary, but no dunlin were observed within the study area itself. No significant displacement or barrier effects are anticipated given the low frequency of occurrence within 500m of the study area.	The magnitude of the effect is assessed as *Negligible*. The cross tablature of a *High* sensitivity species and *Negligible* impact corresponds to a ***Very Low*** effect significance.	**Likely short-term frequent non-significant negative effect**

7.4.5.2 Hen harrier (winter season)

Potential effects during the operational and decommissioning phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Operational Phase			
Direct Habitat Loss	No habitat will be removed as part of the Proposed Development. Direct effects are not anticipated.	**No Effect**	**No Effect**
Displacement and Barrier Effect	The majority of the habitat within the study area is mature commercial conifer forestry plantation, with smaller areas of agricultural pasture in the north. Mature conifer forestry is not used by hunting hen harrier. Wintering hen harrier were occasionally observed hunting within 500m of the wind farm study area. No hen harrier were observed within the wind farm itself. A likely explanation for this is that the study area does not provide attractive hunting habitat for hen harrier, whereas suitable open bog extends south and westward, providing a wide availability of attractive habitat in the surrounding area. Given the lack of observations and limited suitable habitat within the study area itself, no significant displacement or barrier effects are anticipated at the county, national or international level.	The magnitude of the effect is assessed as *Low*. The cross tablature of a *High* sensitivity species and *Low* impact corresponds to a ***Low*** effect significance.	**Likely medium-term constant slight negative effect**
Collision Risk	This species was not recorded within the wind farm study area during the extensive vantage point survey work undertaken. Given this absence, collision-related mortality is not likely to significantly impact this species and the predicted collision risk is negligible. In addition, it is noted that the collision monitoring surveys provide a representative sample of bird fatalities and no hen harrier fatalities were recorded. No significant effects are anticipated.	The magnitude of the effect is assessed as *Negligible*. The cross tablature of a *High* sensitivity species and *Negligible* impact corresponds to a ***Very Low*** effect significance.	**Likely medium-term constant not-significant negative effect**

Potential effects during the operational and decommissioning phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Decommissioning Phase			
Direct Habitat Loss	Once the current planning permission expires (2024) the footprint of the development will revert to its original use as agricultural rough pasture, crops and commercial forestry. This will provide a slight increase in the availability of pasture, crop and forestry habitat locally. However, this will only result in a negligible increase in available habitat relative to its abundance in the wider surroundings. Furthermore, these habitats are not unique to the wind farm site or rare locally. Alternatively, if the operational life is extended (i.e. by c.15 years), a new less invasive decommissioning approach is proposed which would include removing infrastructure (e.g. turbines etc.) but leaving the narrow corridor of the onsite roads in situ. No significant effects are anticipated in either scenario.	The magnitude of the effect is assessed as *Negligible*. The cross tablature of a *High* sensitivity species and *Negligible* impact corresponds to a ***Very Low*** effect significance.	**Likely long-term constant non-significant positive effect**
Displacement	Hen harrier were occasionally recorded within 500m of the wind farm study area boundary, but no hen harrier were observed within the wind farm itself. On a precautionary basis, it is assumed that some temporary displacement may occur on the bog bordering the wind farm during decommissioning works. However, given the low frequency of occurrence and the extent of suitable hunting habitat in the surrounding area, no significant displacement and barrier effects are anticipated at the county, national or international level.	The magnitude of the effect is assessed as *Low*. The cross tablature of a *High* sensitivity species and *Low* impact corresponds to a ***Low*** effect significance.	**Likely short-term frequent slight negative effect**

7.4.5.3 Merlin (all seasons)

Potential effects during the operational and decommissioning phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Operational Phase			
Direct Habitat Loss	No habitat will be removed as part of the Proposed Development. Direct effects are not anticipated.	**No Effect**	**No Effect**
Displacement and Barrier Effect	The majority of the habitat within the study area is mature commercial conifer forestry plantation, with smaller areas of agricultural pasture in the north. Merlin largely favours open habitat but will on occasion utilise mature forestry edges for nesting. Merlin was frequently observed in the wider surrounds of the wind farm and are breeding at Easky Lough. However, of all records, only two were within 500m of the wind farm study area (both of wintering birds) and no merlin were observed within the wind farm itself. A likely explanation for this is that the study area does not provide attractive habitat for merlin, whereas suitable open bog extends south and westward, providing a wide availability of attractive habitat in the surrounding area. Given the separation distance from the nest, and the lack of observations and limited suitable habitat within the study area itself, no significant displacement or barrier effects are anticipated at the county, national or international level.	The magnitude of the effect is assessed as *Low*. The cross tablature of a *Medium* sensitivity species and *Low* impact corresponds to a ***Low*** effect significance.	**Likely medium-term constant slight negative effect**
Collision Risk	This species was not recorded within the wind farm study area during the extensive vantage point survey work undertaken and a nest was found at Easky Lough, south of the wind farm. This limits the potential for significant collision risk, as the flight activity of breeding birds is typically concentrated around their nests. Given this absence within the wind farm, collision-related mortality is not likely to significantly impact this species and the predicted collision risk is negligible. In addition, it is noted that the collision monitoring surveys provide a representative sample of bird fatalities and no merlin fatalities were recorded. No significant effects are anticipated.	The magnitude of the effect is assessed as *Negligible*. The cross tablature of a *Medium* sensitivity species and *Negligible* impact corresponds to a ***Very Low*** effect significance.	**Likely medium-term constant not-significant negative effect**

Potential effects during the operational and decommissioning phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Decommissioning Phase			
Direct Habitat Loss	Once the current planning permission expires (2024) the footprint of the development will revert to its original use as agricultural rough pasture, crops and commercial forestry. This will provide a slight increase in the availability of pasture, crop and forestry habitat locally. However, this will only result in a negligible increase in available habitat relative to its abundance in the wider surroundings. Furthermore, these habitats are not unique to the wind farm site or rare locally. Alternatively, if the operational life is extended (i.e. by c.15 years), a new less invasive decommissioning approach is proposed which would include removing infrastructure (e.g. turbines etc.) but leaving the narrow corridor of the onsite roads in situ. No significant effects are anticipated in either scenario.	The magnitude of the effect is assessed as *Negligible*. The cross tablature of a *Medium* sensitivity species and *Negligible* impact corresponds to a ***Very Low*** effect significance.	**Likely long-term constant non-significant positive effect**
Displacement	Merlin were occasionally recorded within 500m of the wind farm study area boundary, but no merlin were observed within the wind farm itself and a nest site was located at Easky Lough, south of the wind farm. On a precautionary basis, it is assumed that some temporary displacement may occur on the bog bordering the wind farm during decommissioning works. However, given the low frequency of occurrence and the extent of suitable habitat in the surrounding area, no significant displacement and barrier effects are anticipated at the county, national or international level.	The magnitude of the effect is assessed as *Low*. The cross tablature of a *Medium* sensitivity species and *Low* impact corresponds to a ***Low*** effect significance.	**Likely short-term frequent slight negative effect**

7.4.5.4 Kestrel (all seasons)

Potential effects during the operational and decommissioning phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Operational Phase			
Direct Habitat Loss	No habitat will be removed as part of the Proposed Development. Direct effects are not anticipated.	**No Effect**	**No Effect**
Displacement and Barrier Effect	The majority of the habitat within the study area is mature commercial conifer forestry plantation, with smaller areas of agricultural pasture in the north. These habitats may be used by kestrel. Kestrel were regularly recorded within the study area and surrounds throughout the breeding and winter season, and are resident, with breeding likely offsite to the northeast of the wind farm. During the pre-planning bird surveys for the original planning application for the now operational Dunneill Wind Farm in 2001, kestrel were also recorded hunting in the area. This indicates that this species continues to persist here. In addition, significant avoidance of the existing turbines was not evident within the study area, as much of the observed kestrel activity during vantage point surveys was close to the turbines: 29% were 50-100m from turbines, 13% were 100-200m from turbines and 29% were 200-500m from turbines (the remaining 29% were 500m+ from turbines). This observation is further corroborated in the literature: kestrels have been found to only show low levels of turbine avoidance and are known to continue foraging activity close to turbines (Pearce-Higgins *et al.*, 2009). Therefore, it is likely that kestrel will continue to utilise the study area and significant impacts of displacement and barrier effects are not anticipated at the county, national or international level.	The magnitude of the effect is assessed as *Low*. The cross tablature of a *Medium* sensitivity species and *Low* impact corresponds to a ***Low*** effect significance.	**Likely medium-term constant slight negative effect**

Potential effects during the operational and decommissioning phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Collision Risk	This species was recorded flying within the wind farm, including observations at PCH and within 100m of turbines. However, collision-related mortality incidents for this species were not detected during 12 months of dog-led searches at all turbine bases. Furthermore, although likely breeding locally, no nests were identified within the wind farm. This limits the potential for significant collision risk, as the flight activity is typically concentrated around their nests. Based on available data, collision-related mortality is not likely to significantly impact this species and the predicted collision risk is low. No significant effects are anticipated at the county, national or international level.	The magnitude of the effect is assessed as *Low*. The cross tablature of a *Medium* sensitivity species and *Low* impact corresponds to a ***Low*** effect significance.	**Likely medium-term constant slight negative effect**
Decommissioning Phase			
Direct Habitat Loss	Once the current planning permission expires (2024) the footprint of the development will revert to its original use as agricultural rough pasture, crops and commercial forestry. This will provide a slight increase in the availability of pasture, crop and forestry habitat locally. However, this will only result in a negligible increase in available habitat relative to its abundance in the wider surroundings. Furthermore, these habitats are not unique to the wind farm site or rare locally. Alternatively, if the operational life is extended, a new less invasive decommissioning approach is proposed which would include removing infrastructure (e.g. turbines etc.) but leaving the narrow corridor of the onsite roads in situ. No significant effects are anticipated in either scenario.	The magnitude of the effect is assessed as *Negligible*. The cross tablature of a *Medium* sensitivity species and *Negligible* impact corresponds to a ***Very Low*** effect significance.	**Likely long-term constant non-significant positive effect**
Displacement	Kestrel were regularly recorded within the study area and surrounds throughout the breeding and winter season. Birds were hunting in the wind farm, but no breeding behaviour was observed here. There is potential for displacement of hunting kestrel within the study area during decommissioning works. However, given the abundance of similar suitable hunting habitat in the surrounding area and that this is a widespread species and not a habitat specialist, no significant displacement and barrier effects are anticipated at the county, national or international level.	The magnitude of the effect is assessed as *Low*. The cross tablature of a *Medium* sensitivity species and *Low* impact corresponds to a ***Low*** effect significance.	**Likely short-term frequent slight negative effect**

7.4.5.5 Red Grouse (all seasons)

Potential effects during the operational and decommissioning phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Operational Phase			
Direct Habitat Loss	No habitat will be removed as part of the Proposed Development. Direct effects are not anticipated.	**No Effect**	**No Effect**
Displacement and Barrier Effect	The majority of the habitat within the study area is mature commercial conifer forestry plantation, with smaller areas of agricultural pasture in the north. Neither conifer forestry nor agricultural pasture are used by red grouse. Red grouse was regularly observed in bog adjacent to the study area (within 500m of the study area boundary) and are likely breeding locally. No red grouse were recorded within the study area itself. A likely explanation for this is that the study area does not provide attractive habitat for red grouse, whereas suitable open bog extends south and westward where this species was recorded, providing a wide availability of attractive habitat in the surrounding area. Red grouse were similarly recorded in bog adjacent to, but not within, the study area during pre-planning bird surveys for the original planning application for the now operational Dunneill Wind Farm in 2001. This indicates that the species also continues to persist here following the commissioning of the wind farm. Given the lack of observations and limited suitable habitat within the study area itself, no significant displacement or barrier effects are anticipated at the county, national or international level.	The magnitude of the effect is assessed as *Low*. The cross tablature of a *Medium* sensitivity species and *Low* impact corresponds to a ***Low*** effect significance.	**Likely medium-term constant slight negative effect**

Potential effects during the operational and decommissioning phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Collision Risk	This species was not recorded within the wind farm study area during the extensive vantage point survey work undertaken. Furthermore, as previously outlined the habitats of the wind farm site are unlikely to attract this species with any regularity. Given this absence from the wind farm site collision-related mortality is not likely to significantly impact this species and the predicted collision risk is negligible. In addition, it is noted that the collision monitoring surveys provide a representative sample of bird fatalities and no red grouse fatalities were recorded. No significant effects are anticipated.	The magnitude of the effect is assessed as *Negligible*. The cross tablature of a *Medium* sensitivity species and *Negligible* impact corresponds to a ***Very Low*** effect significance.	**Likely medium-term constant not-significant negative effect**
Decommissioning Phase			
Direct Habitat Loss	Once the current planning permission expires (2024) the footprint of the development will revert to its original use as agricultural rough pasture, crops and commercial forestry. This will provide a slight increase in the availability of pasture, crop and forestry habitat locally. However, this will only result in a negligible increase in available habitat relative to its abundance in the wider surroundings. Furthermore, these habitats are not favoured by this species, unique to the wind farm site or rare locally. Alternatively, if the operational life is extended (i.e. by c.15 years), a new less invasive decommissioning approach is proposed which would include removing infrastructure (e.g. turbines etc) but leaving the narrow corridor of the onsite roads in situ. No significant effects are anticipated in either scenario.	The magnitude of the effect is assessed as *Negligible*. The cross tablature of a *Medium* sensitivity species and *Negligible* impact corresponds to a ***Very Low*** effect significance.	**Likely long-term constant non-significant positive effect**
Displacement	Red grouse was regularly observed within 500m of the wind farm study area. On a precautionary basis, it is assumed that some temporary displacement may occur on the bog bordering the wind farm during decommissioning works. However, given the extent of suitable habitat in the surrounding area, no significant displacement and barrier effects are anticipated at the county, national or international level.	The magnitude of the effect is assessed as *Low*. The cross tablature of a *Medium* sensitivity species and *Low* impact corresponds to a ***Low*** effect significance.	**Likely short-term frequent slight negative effect**

7.4.5.6 Snipe (all seasons)

Potential effects during the operational and decommissioning phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Operational Phase			
Direct Habitat Loss	No habitat will be removed as part of the Proposed Development. Direct effects are not anticipated.	**No Effect**	**No Effect**
Displacement and Barrier Effect	The majority of the habitat within the study area is mature commercial conifer forestry plantation, with smaller areas of agricultural pasture in the north. Conifer forestry is not used by snipe. Snipe was regularly observed in bog adjacent to the study area (within 500m of the study area boundary) and are possibly breeding locally. No snipe were recorded within the study area itself. A likely explanation for this is that the majority of the study area does not provide attractive habitat for snipe, whereas suitable open bog extends south and westward where this species was recorded, providing a wide availability of attractive habitat in the surrounding area. Snipe were also recorded in the general area during pre-planning bird surveys for the original planning application for the now operational Dunneill Wind Farm in 2001. This indicates that the species continues to persist here following the commissioning of the wind farm. Given the lack of observations and limited suitable habitat within the study area itself, no significant displacement or barrier effects are anticipated at the county, national or international level.	The magnitude of the effect is assessed as *Low*. The cross tablature of a *Medium* sensitivity species and *Low* impact corresponds to a ***Low*** effect significance.	**Likely medium-term constant slight negative effect**

Potential effects during the operational and decommissioning phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Collision Risk	This species was not recorded within the wind farm study area during the extensive vantage point survey work undertaken. Furthermore, as previously outlined the habitats of the wind farm site are unlikely to attract this species with any regularity. Given this absence from the wind farm site collision-related mortality is not likely to significantly impact this species and the predicted collision risk is negligible. In addition, it is noted that the collision monitoring surveys provide a representative sample of bird fatalities and no snipe fatalities were recorded. No significant effects are anticipated.	The magnitude of the effect is assessed as *Negligible*. The cross tablature of a *Medium* sensitivity species and *Negligible* impact corresponds to a ***Very Low*** effect significance.	**Likely medium-term constant not-significant negative effect**
Decommissioning Phase			
Direct Habitat Loss	Once the current planning permission expires (2024) the footprint of the development will revert to its original use as agricultural rough pasture, crops and commercial forestry. This will provide a slight increase in the availability of pasture, crop and forestry habitat locally. However, this will only result in a negligible increase in available habitat relative to its abundance in the wider surroundings. Furthermore, these habitats are not favoured by this species, unique to the wind farm site or rare locally. Alternatively, if the operational life is extended (i.e. by c.15 years), a new less invasive decommissioning approach is proposed which would include removing infrastructure (e.g. turbines etc.) but leaving the narrow corridor of the onsite roads in situ. No significant effects are anticipated in either scenario.	The magnitude of the effect is assessed as *Negligible*. The cross tablature of a *Medium* sensitivity species and *Negligible* impact corresponds to a ***Very Low*** effect significance.	**Likely long-term constant non-significant positive effect**
Displacement	Snipe was regularly observed within 500m of the wind farm study area. On a precautionary basis, it is assumed that some temporary displacement may occur on the bog bordering the wind farm during decommissioning works. However, given the extent of suitable habitat in the surrounding area, no significant displacement and barrier effects are anticipated at the county, national or international level.	The magnitude of the effect is assessed as *Low*. The cross tablature of a *Medium* sensitivity species and *Low* impact corresponds to a ***Low*** effect significance.	**Likely short-term frequent slight negative effect**

7.4.5.7 Buzzard (all seasons)

Potential effects during the operational and decommissioning phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Operational Phase			
Direct Habitat Loss	No habitat will be removed as part of the Proposed Development. Direct effects are not anticipated.	**No Effect**	**No Effect**
Displacement and Barrier Effect	The majority of the habitat within the study area is mature commercial conifer forestry plantation, with smaller areas of agricultural pasture in the north. These habitats may be used by buzzard. Buzzard were regularly recorded within the study area and surrounds throughout the breeding and winter season and are resident, with breeding likely offsite in the locality. Significant avoidance of the existing turbines was not evident within the study area. Much of the observed buzzard activity was close to the turbines: during vantage point surveys 18% were 0-50m from turbines, 64% were 50-200m from turbines and 14% were 200-500m from turbines (the remaining 4% were 500m+ from turbines), and during walkover surveys 62% were 50-100m from turbines, 23% were 100-200m from turbines and 8% were 200-500m from turbines (the remaining 8% were 500m+ from turbines). Therefore, it is likely that buzzard will continue to utilise the study area and significant impacts of displacement and barrier effects are not anticipated at the county, national or international level.	The magnitude of the effect is assessed as *Low*. The cross tablature of a *Low* sensitivity species and *Low* impact corresponds to a ***Very Low*** effect significance.	**Likely medium-term constant slight negative effect**
Collision Risk	This species was recorded flying within the wind farm, including observations at PCH and within 50m of turbines. However, collision-related mortality incidents for this species were not detected during 12 months of dog-led searches at all turbine bases. Based on available data, collision-related mortality is not likely to significantly impact this species and the predicted collision risk is low. No significant effects are anticipated at the county, national or international level.	The magnitude of the effect is assessed as *Low*. The cross tablature of a *Low* sensitivity species and *Low* impact corresponds to a ***Very Low*** effect significance.	**Likely medium-term constant slight negative effect**

Potential effects during the operational and decommissioning phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Decommissioning Phase			
Direct Habitat Loss	Once the current planning permission expires (2024) the footprint of the development will revert to its original use as agricultural rough pasture, crops and commercial forestry. This will provide a slight increase in the availability of pasture, crop and forestry habitat locally. However, this will only result in a negligible increase in available habitat relative to its abundance in the wider surroundings. Furthermore, these habitats are not unique to the wind farm site or rare locally. Alternatively, if the operational life is extended (i.e. by c.15 years), a new less invasive decommissioning approach is proposed which would include removing infrastructure (e.g. turbines etc.) but leaving the narrow corridor of the onsite roads in situ. No significant effects are anticipated in either scenario.	The magnitude of the effect is assessed as *Negligible*. The cross tablature of a *Low* sensitivity species and *Negligible* impact corresponds to a ***Very Low*** effect significance.	**Likely long-term constant non-significant positive effect**
Displacement	Buzzard were regularly recorded within the study area throughout the breeding and winter season. Birds were hunting in the wind farm, and possible breeding pairs were observed here. Thus, there is potential for displacement of buzzard within the study area during decommissioning works. However, given that there is similar habitat used by buzzard in the surrounding area and that this is an abundant widespread species and not a habitat specialist, no significant displacement and barrier effects are anticipated at the county, national or international level.	The magnitude of the effect is assessed as *Low*. The cross tablature of a *Low* sensitivity species and *Low* impact corresponds to a ***Very Low*** effect significance.	**Likely short-term frequent slight negative effect**

7.4.5.8 Sparrowhawk (all seasons)

Potential effects during the operational and decommissioning phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Operational Phase			
Direct Habitat Loss	No habitat will be removed as part of the Proposed Development. Direct effects are not anticipated.	**No Effect**	**No Effect**
Displacement and Barrier Effect	The majority of the habitat within the study area is mature commercial conifer forestry plantation, with smaller areas of agricultural pasture in the north. These habitats may be used by sparrowhawk. Sparrowhawk were regularly recorded within the study area and surrounds throughout the breeding and winter season. Significant avoidance of the existing turbines was not evident within the study area. Much of the observed sparrowhawk activity during vantage point surveys was close to the turbines: 17% were 0-50m from turbines, 50% were 50-200m from turbines and 33% were 200-500m from turbines. Therefore, it is likely that sparrowhawk will continue to utilise the study area and significant impacts of displacement and barrier effects are not anticipated at the county, national or international level.	The magnitude of the effect is assessed as *Low*. The cross tablature of a *Low* sensitivity species and *Low* impact corresponds to a ***Very Low*** effect significance.	**Likely medium-term constant slight negative effect**
Collision Risk	This species was recorded flying within the wind farm, including observations at PCH and within 50m of turbines. However, collision-related mortality incidents for this species were not detected during 12 months of dog-led searches at all turbine bases. Based on available data, collision-related mortality is not likely to significantly impact this species and the predicted collision risk is low. No significant effects are anticipated at the county, national or international level.	The magnitude of the effect is assessed as *Low*. The cross tablature of a *Low* sensitivity species and *Low* impact corresponds to a ***Very Low*** effect significance.	**Likely medium-term constant slight negative effect**

Potential effects during the operational and decommissioning phases of the Proposed Development		Significance (Percival, 2003)	Significance (EPA, 2022)
Decommissioning Phase			
Direct Habitat Loss	Once the current planning permission expires (2024) the footprint of the development will revert to its original use as agricultural rough pasture, crops and commercial forestry. This will provide a slight increase in the availability of pasture, crop and forestry habitat locally. However, this will only result in a negligible increase in available habitat relative to its abundance in the wider surroundings. Furthermore, these habitats are not unique to the wind farm site or rare locally. Alternatively, if the operational life is extended (i.e. by c.15 years), a new less invasive decommissioning approach is proposed which would include removing infrastructure (e.g. turbines etc.) but leaving the narrow corridor of the onsite roads in situ. No significant effects are anticipated in either scenario.	The magnitude of the effect is assessed as *Negligible*. The cross tablature of a *Low* sensitivity species and *Negligible* impact corresponds to a ***Very Low*** effect significance.	**Likely long-term constant non-significant positive effect**
Displacement	Sparrowhawk were regularly recorded within the study area in the breeding and winter season. Thus, there is potential for displacement of sparrowhawk within the study area during decommissioning works. However, given that there is similar habitat used by sparrowhawk in the surrounding area and that this is an abundant widespread species and not a habitat specialist, no significant displacement and barrier effects are anticipated at the county, national or international level.	The magnitude of the effect is assessed as *Low*. The cross tablature of a *Low* sensitivity species and *Low* impact corresponds to a ***Very Low*** effect significance.	**Likely short-term frequent slight negative effect**

7.4.6 Do-Nothing Effect

The 'Do-Nothing' scenario entails the decommissioning of the existing wind farm once the current planning permission expires (2024) and restoration of the site to its original use as agricultural lands for pasture and crops. Condition 10 of the original Planning Application to Sligo County Council (Ref: PL 03619) states the following in relation to the decommissioning of the wind farm:

> *'Upon termination of the use of the wind farm, the mast and turbines shall be dismantled and removed from the site and the site shall be restored to its existing condition in consultation with the planning authority. Prior to the commencement of development, the developer shall lodge with the planning authority, a cash deposit, a bond of an insurance company, or other security to secure the satisfactory reinstatement of the site on the cessation of the project. The amount of the security shall be 100,000 euro'.*

Should the Decommissioning Plan as set out in the Planning Conditions for Dunneill Wind Farm be implemented it may lead to potential disturbance and displacement of avian populations due to the potentially extensive ground works required to remove existing access tracks and the turbine foundations. Local populations are not expected to be significantly affected during these potential decommissioning works, however a more environmentally sensitive approach is outlined for the end of the proposed extended operational period (i.e. in 15 years), as set out in Section 7.5.3 below. The effect of decommissioning is considered to have a long-term, slight negative impact in the context of this EIAR. Decommissioning effects are also described for each species in Section 7.4.5.

Following decommissioning, operational effects (as described in Section 7.4.5) will no longer act on the local avian community. In summary, no effect significance greater than ***Low,*** as per Percival (2003) criteria, was identified for any KOR. No effect significance greater than ***Slight,*** as per EPA (2022) criteria, was identified for any KOR. Therefore no significant effect is predicted.

7.4.7 Effects on Designated Areas

The wind farm study area is not located within the boundaries of any European Sites (see Section 7.3.1). An Appropriate Assessment screening was prepared to provide the information necessary to complete an Appropriate Assessment for the Proposed Development (see Chapter 6 of this EIAR). The screening identified and assessed a potential pathway for indirect effects on the Ox Mountains SAC.

The Ox Mountains SAC is not designated for any bird species. Furthermore, following the screening, a Naural Impact Statement was prepared which concluded that "*following an examination, evaluation and analysis, in light of best scientific knowledge and the conservation objectives of the site, and, on the basis of objective information, having taken into account the relevant mitigation measures, it can be concluded that the Proposed Development will not have an adverse impact on any European Sites, either alone or in combination with other plans or projects*". As such, it can be concluded that the proposed development will not have an adverse impact on any European Sites designated for birds, either alone or in combination with other plans or projects.

In relation to nationally designated sites, the Dunneill River proposed Natural Heritage Area was identified as being within the ZOI and assessed in Chaper 6 of this EIAR. It was concluded that "*there will be no significant effects on any [nationally] designated site as a result of the extension of the operational life of the existing windfarm.*" No other proposed National Heritage Area or National Heritage Area within the ZOI were considered as ornithological ecological receptors in their own right due to the separation distance from the Proposed Development and the absence of connectivity.

7.5 Mitigation and Best Practice Measures

This section describes the measures that are in place to mitigate the negative effects associated with the Proposed Development on avian receptors. Effects on avian receptors may be addressed in two ways: (i) design of the Proposed Development and (ii) management of the development phases.

Because this planning application relates to the extension of life to an existing wind farm, there will be no design stage. However, it may be noted that the original project design ensured that hard standing areas were designed to the minimum size necessary to accommodate the turbines and that grid connection cables were laid underground to reduce effects on habitat above, both of which avoid the potential for significant effects on avian receptors.

The development phases of a project are (i) the construction phase, (ii) the operation of the wind farm and (ii) decommissioning of the wind farm. Because this planning application relates to the extension of life to an existing wind farm, there will be no construction phase. Mitigation relating to the remaining phases are discussed below.

7.5.1 Construction Phase Mitigation

There is no construction phase, as there will be no works required to extend the operational period.

7.5.2 Operational Phase Mitigation

No significant operational phase impacts requiring mitigation were identified.

7.5.3 Decommissioning Phase Mitigation

The potential impacts associated with future decommissioning of the Proposed Development in c.15 years will be similar to those associated with a typical wind farm construction but of a reduced magnitude, due to the reduced scale of the proposed decommissioning works, as outlined in Chapter 4 of this EIAR. During decommissioning, it may be possible to reverse or at least reduce some of the potential impacts caused during the initial construction of the wind farm by rehabilitating construction areas such as turbine bases and hard standing areas. This will be done by covering with local topsoil and reseeding with a local native mix to encourage vegetation growth and reduce run-off and sedimentation.

Condition 10 of the original Planning Application (Ref: PL 03619) is set out in Section 7.4.6. It is considered that this Condition is not appropriate, from an environmental perspective, for the Proposed Development. Upon decommissioning of the Proposed Development, the wind turbines will be disassembled in reverse order to how they were erected. All above-ground turbine components will be separated and removed off-site for reuse or recycling. The disassembly and removal of the turbines will not have a significant impact on local bird populations at the site.

It is proposed to leave turbine foundations in place underground and to cover with earth and reseed 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 significant environmental nuisances such as noise, vibration and dust. It is also proposed to leave underground cables in place where they are unlikely to be impacted by typical agricultural and forestry works. It is proposed that site roadways will be left in situ, as appropriate, to facilitate access for agricultural and commercial forestry lands.

Mitigation measures, as outlined below, will be implemented during the future decommissioning phase to avoid any potential impacts. A decommissioning plan will be agreed with the local authorities at least three months prior to decommissioning of the Proposed Development. This decommissioning plan will include industry best practise measures to mitigate the impact of works on birds, which may include the following:

- All machinery will work from the existing access road corridor.
- Any required vegetation removal will be conducted in line with the provisions of the Wildlife Acts 1976-2021.
- Construction works will begin outside the bird nesting season as defined by the Wildlife Act 1976 as amended (1st of March to the 31st of August). Any requirement for works to run into the subsequent breeding season will be subject to pre-works bird surveys to confirm the absence of breeding birds of conservation concern. If such breeding activity is identified during the works, the nest sites will be located, and no works shall be undertaken within an agreed buffer in line with industry best practise.
- Noise limits, noise control measures, hours of operation (i.e. dusk and dawn is high faunal activity time) and selection of plant items will be considered in relation to disturbance of birds. All plant and equipment for use will comply with the European Communities (Noise Emission By Equipment For Use Outdoors) Regulations, 2001, as amended (SI 632/2001). Plant machinery will also be turned off when not in use.
- Silt fences will be installed as an additional water protection measure around existing watercourses.
- An Environmental Clerk of Works and Project Ecologist will be appointed. Duties will include:

    - Organise the undertaking of a pre-works walkover bird survey to ensure that significant effects on birds will be avoided.
    - Inform and educate on-site personnel of the ornithological and ecological sensitivities within the wind farm study area.
    - Oversee management of ornithological issues during the works period and advise on ornithological issues as they arise.
    - Provide guidance to contractors to ensure legal compliance with respect to protected species onsite.
    - Liaise with officers of consenting authorities and other relevant bodies with regular updates in relation to decommissioning progress.

7.6 Monitoring

The following monitoring measures are proposed as industry best practise rather than in response to any identified impacts associated with the Proposed Development.

7.6.1 Operation

A detailed Bird Monitoring Programme has been prepared for the extended operational phase of the existing wind farm (refer to Appendix 7-6 for further details). The programme of works will monitor parameters associated with collision, displacement/barrier effects and habituation during the extended operational phase. Surveys will be scheduled to coincide with Years 1, 2, 3, 5, 10 and (if applicable) 15 of the remaining operational lifetime of the wind farm. Monitoring measures are broadly based on guidelines issued by SNH (2009). The following individual components are proposed:

- Monthly flight activity surveys: vantage point surveys.
- Targeted bird collision surveys (corpse searches) will be undertaken with trained dogs. The surveys will include detection and scavenger trials, to correct for these two biases and ensure the resulting data is robust.

7.6.2 Decommissioning

Decommissioning monitoring surveys will be undertaken prior to works associated with decommissioning at the wind farm. The survey will include a thorough walkover survey to a 500m radius of the development footprint and all works areas, where access allows. If winter roosting or breeding activity of birds of high conservation concern is identified, the roost or nest site will be located and earmarked for monitoring at the beginning of the first winter or breeding season of the decommissioning phase. If it is found to be active during the decommissioning phase, no works shall be undertaken within a disturbance buffer (Forestry Commission Scotland, 2006; Ruddock and Whitfield, 2007) in line with industry best practice. No works shall be permitted within the buffer until it can be demonstrated that the roost/nest is no longer occupied.

7.7 Residual Effects

The following species were identified as KORs and were subject to a detailed impact assessment:

- Dunlin (breeding season)
- Hen harrier (winter season))
- Merlin (all seasons)
- Kestrel (all seasons)
- Red Grouse (all seasons)
- Snipe (all seasons)
- Buzzard (all seasons)
- Sparrowhawk (all seasons)

No effect significance greater than ***Low,*** as per Percival (2003) criteria, was identified for any KOR. No effect significance greater than ***Slight,*** as per EPA (2022) criteria, was identified for any KOR. Taking into consideration the effect significance levels identified and the proposed best practice and mitigation outlined in Section 7.5, significant residual effects on the KORs with regard to direct habitat loss, displacement or collision mortality are not anticipated.

7.8 Cumulative Effects

As per NatureScot guidance "Assessing the Cumulative Impacts of onshore Wind Energy Developments" (SNH, 2012), cumulative effects arising from two or more developments may be:

- **Additive** (a multiple independent additive model)
- **Antagonistic** (the sum of impacts are less that in a multiple independent additive model)
- **Synergistic** (the cumulative impact is greater than the sum of the multiple individual effects)

This section first identifies other plans and projects in the vicinity of the study area and then assesses the potential for additive, antagonistic or synergistic impacts to occur.

7.8.1 Other Plans and Projects

Assessment material was compiled for relevant developments within the vicinity of the wind farm study area. The material was gathered through a search of relevant online Planning Registers, reviews of relevant EIS/EIAR documents, planning application details and planning drawings. It served to identify past and future plans and projects, their activities and their environmental impacts. These are then considered for in-combination or cumulative effects with the Proposed Development. All plans and projects reviewed are outlined below.

7.8.1.1 Plans Considered in the Cumulative Impact Assessment

The following plans were considered in the cumulative impact assessment:

- Sligo County Development Plan 2017-2023
- Regional Planning Guidelines for the West Region 2010-2022
- National Biodiversity Action Plan 2017-2021

The policies and objectives of these plans have been taken into account in this cumulative assessment.

7.8.1.2 Projects Considered in the Cumulative Impact Assessment

NatureScot guidance (SNH, 2012; 2018) was consulted while undertaking the cumulative assessment. SNH (2012; 2018) emphasises that its priority is to 'maintain the conservation status of the species population at the national level.' However, it is acknowledged that consideration should also be allowed for impacts at the regional level 'where regional impacts have national implications (for example where a specific region holds the majority of the national population)'. A 20km radius of the Proposed Development was considered an appropriate regional scale given the foraging range of the key ornithological receptors identified within the Proposed Development area.

To conduct the cumulative impact assessment, Sligo County Council online planning registers, relevant EIAR (or EIS) documents, planning application details and planning drawings in the vicinity of the proposed wind farm study area and all associated works were reviewed to identify past and future projects, their activities and their environmental impacts. The findings of this review are outlined in the following sections for forestry and agricultural practices, other developments/landuses, and other wind farm developments.

7.8.1.2.2 Developments/Landuses

The review of the County Council planning register identified relevant general development planning applications in the vicinity of the Proposed Development. Most of these relate to the provision and/or alteration of housing, agriculture-related structures and community facilities, as described in Chapter 2 of this EIAR. Owing to the scale and nature of these developments, significant cumulative impacts are not anticipated.

Large areas within the wider surroundings are planted with commercial forestry. The forestry works (felling/planting) associated with the forestry in the wider surroundings of the proposed development will be subject to relevant licencing and guidance from the Forestry Service.

The remaining land use in the surrounding area is predominantly agriculture in the form of livestock grazing. These applications and land uses have also been taken into account in this cumulative assessment.

7.8.1.2.3 Other Wind Farm Developments

Wind farm projects within 20km of the Proposed Development are provided in Table 7-12, including details of their planning status. A total of 48 existing turbines were identified for consideration. The environmental impacts of each permitted or existing wind farm are outlined in detail in this section.

Table 7-12 Wind energy applications within 20km of the wind farm study area

County	Wind Farm	County	Planning Status	Number of Turbines	Distance from wind farm
Sligo	Kingsmountain	Sligo	Existing	10	c.2km
	Black Lough	Sligo	Existing	4	c.6km
	Cloonkeelaun	Sligo	Existing	3	c.9km
	Cloonkeelaun II	Sligo	Existing	1	c.9km
	Cloonkeelaun III	Sligo	Existing	2	c.9km
	Lackan	Sligo	Existing	3	c.15km
Mayo	Carrowleagh	Mayo	Existing	13	c.10km
	Bunnyconnellan	Mayo	Existing	12	c.11km

Kingsmountain

The potential for the Proposed Development to result in significant cumulative or in-combination effects when assessed alongside Kingsmountain Wind Farm was considered. The planning file (ref. 97469) was reviewed on the Sligo County Council Planning Register and no information regarding potential effects on birds was available. However, given the location of the wind farm, the nature of the habitats onsite (as reviewed on publicly available aerial photography) and the lack of significant residual impacts on bird species associated with the Dunneill Wind Farm when considered on its own, significant cumulative or in-combination effects on KORs with regard to displacement or collision mortality are not anticipated.

Black Lough

The potential for the Proposed Development to result in significant cumulative or in-combination effects when assessed alongside Black Lough Wind Farm was considered. The planning file (ref. 1793) was reviewed on the Sligo County Council Planning Register and the Environmental Impact Statement (EIS) was reviewed. An assessment of potential impacts on birds was undertaken for this wind farm comprising desk studies and field surveys. Kestrel, red grouse, snipe and sparrowhawk were recorded during field surveys in both the breeding and non-breeding season, while hen harrier was recorded infrequently during the winter season only.

Red grouse and snipe were likely breeding in the locality of Black Lough. However, no impacts on designated sites were identified, nor impacts on bird species using the study area. Collision risk at Black Lough was assessed for snipe and red grouse and the potential loss of numbers to collision was not considered significant. In addition, the predicted rate of collisions at Dunneill Wind Farm for snipe (negligible) and red grouse (negligible) is sufficiently low that significant cumulative effects between Black Lough Wind Farm and the Proposed Development are not anticipated. Based on this information, as well as the location of Black Lough wind farm, the nature of the habitats onsite (as reviewed on publicly available aerial photography) and the lack of significant residual impacts on bird species associated with the Dunneill Wind Farm when considered on its own, significant cumulative or in-combination effects on KORs with regard to displacement or collision mortality are not anticipated.

Cloonkeelaun I, II & III

The potential for the Proposed Development to result in significant cumulative or in-combination effects when assessed alongside Cloonkeelaun Wind Farms I, II & III was considered. The planning file was reviewed on the Sligo County Council Planning Register and the EISs were reviewed.

At Cloonkeelaun I, a study was conducted on birdlife in and around the site. Sparrowhawk, kestrel, red grouse and snipe were recorded during surveys. This study concluded that impacts of the operation of the wind farm in the footprint of the development is likely to be low and that, based on the species observed, including the flight pattern of red grouse, collision risk was considered to be low.

At Cloonkeelaun II, kestrel, merlin, red grouse and snipe were recorded during surveys. Kestrel and merlin were considered likely to forage over the wind farm site, snipe were considered likely to occur within the wind farm site, and red grouse was considered likely to occur within the wind farm site (although none were recorded on site during Appropriate Assessment Screening). Based on the small area of habitat likely to be impacted, and the large extent of alternative foraging and nesting sites in the sourroundings, the impact of habitat loss and displacement was deemed to be low. Also, based on the species observed, including the flight pattern of red grouse, collision risk was considered to be low.

Finally, at Cloonkeelaun III, buzzard, snipe and kestrel were recorded at the wind farm site and red grouse were recorded within 500m of the site. Disturbance during the operational phase was predicted to be limited. Also, based on the species observed, including the flight pattern of red grouse, collision risk was considered to be low.

In summary, for all three parts of Cloonkeelaun wind farm, the EISs concluded that no significant residual impacts on the local bird population were foreseen. In addition, the predicted rate of collisions for all KORs at Dunneill Wind Farm (negligible or low) is sufficiently low that significant cumulative effects between Cloonkeelaun Wind Farm and the Proposed Development are not anticipated. Based on this information, as well as the location of the Cloonkeelaun wind farms, the nature of the habitats onsite (as reviewed on publicly available aerial photography) and the lack of significant residual impacts on bird species associated with Dunneill Wind Farm when considered on its own, significant cumulative or in-combination effects on KORs with regard to displacement or collision mortality are not anticipated.

Lackan Wind Farm

The potential for the Proposed Development to result in significant cumulative or in-combination effects when assessed alongside Lackan Wind Farm was considered. The planning file was reviewed on the Sligo County Council Planning Register and no information regarding potential effects on birds was available. However, given the location of the wind farm, the nature of the habitats onsite (as reviewed on publicly available aerial photography) and the lack of significant residual impacts on bird species associated with Dunneill Wind Farm when considered on its own, significant cumulative or in-combination effects on KORs with regard to displacement or collision mortality are not anticipated.

Carrowleagh Wind Farm

The potential for the Proposed Development to result in significant cumulative or in-combination effects when assessed alongside Carrowleagh Wind Farm was considered. The planning file was reviewed on the Mayo County Council Planning Register and the EIS was reviewed. A study was conducted for birdlife in and around the side. Hen harrier, sparrowhawk, kestrel, merlin, red grouse and snipe were recorded during both the breeding and winter season.

A pair of merlin were breeding outside the wind farm site and fledged three young. At least three pairs of red grouse were considered to be breeding to the east of the wind farm. A hen harrier pair were known to be nesting north of the site, but no foraging or breeding hen harrier were observed using the site. Finally, at least six pairs of snipe were recorded on the wind farm site and temporary disturbance was anticipated during the construction phase. None of the breeding species recorded were considered to be at high risk of collision, given the range of species observed and the relatively low densities, and no known bird migration route through this area was noted. In addition, the predicted rate of collisions for all KORs at Dunneill Wind Farm (negligible or low) is sufficiently low that significant cumulative effects between Carrowleagh Wind Farm and the Proposed Development are not anticipated.

It was concluded that once the wind farm was constructed outside the breeding season, there will not be any long-term adverse impacts on birds using the site. Based on this information, as well as the location of Carrowleagh wind farm, the nature of the habitats onsite (as reviewed on publicly available aerial photography) and the lack of significant residual impacts on bird species associated with Dunneill Wind Farm when considered on its own, significant cumulative or in-combination effects on KORs with regard to displacement or collision mortality are not anticipated.

Bunnyconnellan Wind Farm

The potential for the Proposed Development to result in significant cumulative or in-combination effects when assessed alongside Bunnyconnellan Wind Farm was considered. The planning file was reviewed on the Mayo County Council Planning Register and the EIS was reviewed. Bird surveys were conducted at the site and sparrowhawk, hunting kestrel, breeding red grouse and breeding snipe were recorded.

The most sensitive species recorded was red grouse; a breeding territory was identified on site. However, no significant negative effect on red grouse populations within the area was identified because the footprint of the development was in degraded habitat. No collision risk for red grouse or snipe was identified because these species typically fly low to the ground. In addition, the predicted rate of collisions for all KORs at Dunneill Wind Farm (negligible or low) is sufficiently low that significant cumulative effects between Bunnyconnellan Wind Farm and the Proposed Development are not anticipated. Based on this information, as well as the location of Bunnyconnellan wind farm (red grouse generally do not range this distance) and the lack of significant residual impacts on red grouse and other bird species associated with Dunneill Wind Farm when considered on its own, significant cumulative or in-combination effects on KORs with regard to displacement or collision mortality are not anticipated.

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7.8.2 Assessment of Cumulative Effects

There were eight KORs identified at the Proposed Development: dunlin, hen harrier, merlin, kestrel, red grouse, snipe, buzzard and sparrowhawk. A key consideration in the assessment of the potential for cumulative impacts to result in significant effects on KORs is proximity. For the purposes of this cumulative assessment, the local scale is considered to be a 5km radius of the wind farm study area. There was only one wind farm within 5km of Dunneill Wind Farm (Kingsmountain Wind Farm); the remaining were within 5-15km.

Following SNH (2012) guidance, the cumulative impact assessment has been carried out at the scale of the importance rating of the KOR: National Importance (dunlin); County Importance (hen harrier, merlin, red grouse and snipe); and Local Importance Higher Value (kestrel, buzzard and sparrowhawk). The assessment of cumulative effects on KORs is provided in Table 7-13 below. In particular, cumulative displacement associated with operational turbines is assessed.

Destruction disturbance associated with the decommissioning phase is a short-term impact and as such is not typically considered likely to contribute to significant cumulative effects. For this reason, it is not considered further.

Table 7-13 Assessment of cumulative effects on KORs

KOR	Evaluation of Cumulative Impacts	Determination
Dunlin (National Importance)	Dunlin were recorded in bog adjacent to the wind farm during the breeding season, including one observation approximately 500m from the study area boundary. No dunlin were observed within the study area itself and no significant effects of collision risk are anticipated. Given the low frequency of occurrence within 500m of the study area and the absence of suitable habitat in the study area, significant impacts of displacement and barrier effects are negligible. The potential for other developments to have resulted in significant cumulative or in combination effects when assessed alongside the Proposed Development was considered. No significant effects were reported for any of the wind farms located within a 20km radius of the wind farm study area. The predicted rate of collisions for dunlin is sufficiently low that significant cumulative effects between the Proposed Development and wind farms located within a 20km radius are not anticipated. Taking into consideration the reported effects at other wind farms and the predicted effects of the Proposed Development, no significant residual additive, antagonistic or synergistic effects have been identified with regard to displacement.	Significant cumulative impacts are not predicted.

KOR	Evaluation of Cumulative Impacts	Determination
Hen harrier (County Importance)	Wintering hen harrier were occasionally observed hunting within 500m of the wind farm study area. No hen harrier were observed within the wind farm itself and no significant effects of collision risk are anticipated. Given the lack of observations and limited suitable habitat within the study area itself, significant impacts of displacement and barrier effects are low. The potential for other developments to have resulted in significant cumulative or in combination effects when assessed alongside the Proposed Development was considered. No significant effects were reported for any of the wind farms located within a 20km radius of the wind farm study area. The predicted rate of collisions for hen harrier is sufficiently low that significant cumulative effects between the Proposed Development and wind farms located within a 20km radius are not anticipated. Taking into consideration the reported effects at other wind farms and the predicted effects of the Proposed Development, no significant residual additive, antagonistic or synergistic effects have been identified with regard to displacement.	Significant cumulative impacts are not predicted.
Merlin (County Importance)	Merlin are resident in the wider surrounds of the wind farm, with a nest located at Easky Lough, south of the study area. Only two observations were within 500m of the wind farm study area - no merlin were observed within the wind farm itself - and no significant effects of collision risk are anticipated. Given the lack of observations and limited suitable habitat within the study area itself, significant impacts of displacement and barrier effects are low. The potential for other developments to have resulted in significant cumulative or in combination effects when assessed alongside the Proposed Development was considered. No significant effects were reported for any of the wind farms located within a 20km radius of the wind farm study area. The predicted rate of collisions for merlin is sufficiently low that significant cumulative effects between the Proposed Development and wind farms located within a 20km radius are not anticipated. Taking into consideration the reported effects at other wind farms and the predicted effects of the Proposed Development, no significant residual additive, antagonistic or synergistic effects have been identified with regard to displacement.	Significant cumulative impacts are not predicted.

KOR	Evaluation of Cumulative Impacts	Determination
Kestrel (Local Importance – Higher Value)	Kestrel are resident within the study area and surroundings. Based on observations to date, it is likely that kestrel will continue to utilise the study area and the impacts of displacement and barrier effects as a result of the proposed development are classed as of low significance. No significant effects of collision risk are anticipated at the county, national or international level. The potential for other developments to have resulted in significant cumulative or in combination effects when assessed alongside the Proposed Development was considered. No significant effects were reported for any of the wind farms located within a 20km radius of the wind farm study area. The predicted rate of collisions for kestrel is sufficiently low that significant cumulative effects between the Proposed Development and wind farms located within a 20km radius are not anticipated. Taking into consideration the reported effects at other wind farms and the predicted effects of the Proposed Development, no significant residual additive, antagonistic or synergistic effects have been identified with regard to displacement.	Significant cumulative impacts are not predicted.
Red Grouse (County Importance)	Red grouse was regularly observed in the bog adjacent to the study area, but no red grouse were recorded within the study area itself and no significant effects of collision risk are anticipated. Given the lack of observations and limited suitable habitat within the study area itself, the impacts of displacement and barrier effects as a result of the proposed development are classed as of low significance. The potential for other developments to have resulted in significant cumulative or in combination effects when assessed alongside the Proposed Development was considered. Breeding red grouse were recorded at Bunnyconnellan Wind Farm, however, no significant negative effect of the wind farm on red grouse populations within the area was identified. The predicted rate of collisions for red grouse is sufficiently low that significant cumulative effects between the Proposed Development and wind farms located within a 20km radius are not anticipated. Taking into consideration the reported effects at Ballyconnellan and other wind farms and the predicted effects of the Proposed Development, no significant residual additive, antagonistic or synergistic effects have been identified with regard to displacement.	Significant cumulative impacts are not predicted.

KOR	Evaluation of Cumulative Impacts	Determination
Snipe (County Importance)	Snipe was regularly observed in bog adjacent to the study area, but no snipe were recorded within the study area itself and no significant effects of collision risk are anticipated. Given the lack of observations and limited suitable habitat within the study area itself, the impacts of displacement and barrier effects as a result of the proposed development are classed as of low significance. The potential for other developments to have resulted in significant cumulative or in combination effects when assessed alongside the Proposed Development was considered. No significant effects were reported for any of the wind farms located within a 20km radius of the wind farm study area. The predicted rate of collisions for snipe is sufficiently low that significant cumulative effects between the Proposed Development and wind farms located within a 20km radius are not anticipated. Taking into consideration the reported effects at other wind farms and the predicted effects of the Proposed Development, no significant residual additive, antagonistic or synergistic effects have been identified with regard to displacement.	Significant cumulative impacts are not predicted.
Buzzard (Local Importance – Higher Value)	Buzzard are resident within the study area and surroundings. Based on observations to date, it is likely that buzzard will continue to utilise the study area and the impacts of displacement and barrier effects as a result of the proposed development are classed as of low significance. No significant effects of collision risk are anticipated at the county, national or international level. The potential for other developments to have resulted in significant cumulative or in combination effects when assessed alongside the Proposed Development was considered. No significant effects were reported for any of the wind farms located within a 20km radius of the wind farm study area. The predicted rate of collisions for buzzard is sufficiently low that significant cumulative effects between the Proposed Development and wind farms located within a 20km radius are not anticipated. Taking into consideration the reported effects at other wind farms and the predicted effects of the Proposed Development, no significant residual additive, antagonistic or synergistic effects have been identified with regard to displacement.	Significant cumulative impacts are not predicted.

KOR	Evaluation of Cumulative Impacts	Determination
Sparrowhawk (Local Importance – Higher Value)	Sparrowhawk were regularly recorded within the study area and surroundings. Based on observations to date, it is likely that sparrowhawk will continue to utilise the study area and the impacts of displacement and barrier effects as a result of the proposed development are classed as of low significance. No significant effects of collision risk are anticipated at the county, national or international level. The potential for other developments to have resulted in significant cumulative or in combination effects when assessed alongside the Proposed Development was considered. No significant effects were reported for any of the wind farms located within a 20km radius of the wind farm study area. The predicted rate of collisions for sparrowhawk is sufficiently low that significant cumulative effects between the Proposed Development and wind farms located within a 20km radius are not anticipated. Taking into consideration the reported effects at other wind farms and the predicted effects of the Proposed Development, no significant residual additive, antagonistic or synergistic effects have been identified with regard to displacement.	Significant cumulative impacts are not predicted.

7.9 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 KORs. No significant effects on receptors of International, National or County Importance were identified. Provided that the Proposed Development continues operation and is decommissioned in accordance with the best practice mitigation measures that are described within this application, significant individual or cumulative effects on the identified KORs are not anticipated.