

Non-Technical Summary

Curraglass Renewable Energy
Development, Co. Cork





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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 Wingleaf Ltd., as part of an application for planning permission to Cork County Council to construct a renewable energy development on the site of the original wind farm located in the townlands of Cappaboy Beg, Derreendonee and Curraglass, Co. Cork.

The Proposed Development site is located approximately 5.6km northeast of Kealkill and 5.5km southwest of the village of Ballingeary, with proposed works taking place within the townlands of Derreendonee and Curraglass.

The previous wind turbines at the site were granted planning permission in 2002 and the site was constructed and became operational in 2006. The turbines were removed in June 2018 as they had reached the end of their productive lifespan. The previous development consisted of 10 turbines, with a hub height of 50m and a total tip height of 75m.

Wingleaf Ltd. is now seeking to optimise the site with a renewable energy development comprising 7 turbines with a tip height of up to 178.5 metres. The Proposed Development will ensure that it maximises the amount of renewable energy generated from the wind resource at this site using the most modern wind turbine technologies in order to contribute to Ireland's ambitious renewable energy generation targets as set out in the Climate Action Plan 2019, i.e. 70% renewable energy generation by 2030.

This application includes for a connection to the national grid; with this EIAR assessing a new proposed 38kV Electricity Substation connecting via underground cabling to an existing 38kV overhead line within the EIAR Site Boundary, located in the townland of Curraglass, Co. Cork.

The layout of the Proposed Development has been constraints-led, thereby avoiding the environmentally sensitive parts of the site. The roads layout for the Proposed Development makes use of the existing onsite access roads and tracks where possible, with approximately 5 kilometres of existing roadway/tracks, some which will require upgrading and approximately 2.5 kilometres of new access road to be constructed.

The closest property is located approximately 760 metres from the nearest proposed turbine location (T7). There are 4 No. properties located within one kilometre of the proposed turbine locations, all of which are dwellings.

The Cork County Development Plan (CDP) 2014 contains a Wind Energy Strategy (WES) which identifies, in broad strategic terms, three categories of 'Wind Deployment Area' for large scale commercial wind energy developments. These categories are "Acceptable in Principle", "Open to Consideration" and "Normally Discouraged".

All 7 no. turbines proposed are within an area designated as "Open to Consideration" for wind energy development by the CDP. The CDP states that this category has been applied to areas with some capacity to absorb wind development, but which are sensitive enough to require a site-by-site appraisal to ascertain the suitability of the area for development. The use of the Proposed Development site for wind energy generation has previously been established as there was an operational wind farm on the site between 2006 and 2018.

Need for the Proposed Development

The EU adopted Directive (2009/28/EC) on the Promotion of the Use of Energy from Renewable Sources in April 2009 which includes a common EU framework for the promotion of energy from renewable sources. The Directive sets a mandatory national target for the overall share of energy from renewable sources for each Member State.

To ensure that the mandatory national targets are achieved, Member States must follow an indicative trajectory towards the achievement of their target as outlined in Ireland's National Renewable Energy Action Plan (NREAP). Ireland's mandatory national target is to supply 16% of its overall energy needs from renewable sources by 2020. This target covers energy in the form of electricity (RES-E), heat (RES-H) and transport fuels (RES-T). The contribution of renewables to gross final consumption (GFC) was 9.5% in 2016, compared to the 2020 target of 16% (*Energy in Ireland 1990-2016*; SEAI, December 2017). Furthermore, In March 2019, the Government announced a renewable electricity target of 70% by 2030. The Proposed Development is likely to be operational before 2030 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 both 2020 and 2030 despite climate action measures in the National Development Plan (EPA, June 2019).

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. This Plan clearly recognises that Ireland must significantly step up its commitments to tackle climate disruption. The CAP identifies a need for 8.2GW of onshore wind generation. Only 3.7GW is in place as of December 2019, therefore Ireland needs to more than double its installed capacity of wind generation. The CAP presents clear and unequivocal support for the provision of additional renewable energy generation and presents yet further policy support for increased wind energy.

Economic Benefits

The Proposed Development will be capable of providing power to over 21,900 households every year, as presented in the calculations in Section 4.3.1.6 of this EIAR.

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 and short-term benefits for the local economy including job creation, landowner payments, local authority commercial rate payments and a Community Benefit Scheme.

The annual commercial rate payments from the Proposed Development to Cork County Council, will be redirected to the provision of public services within Co. Cork. 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 project will create approximately 70 jobs during the construction, operational and maintenance phases of the Proposed Development. During construction, 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.

There are substantial opportunities available for areas where wind farms and other types of renewable energy developments are located, in the form of Community Gain Funds. Based on the current proposal, a Community Gain Fund in the region of €1.8 million will be made available over the lifetime of the project. The value of this fund will be directly proportional to the level of installed MWs 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.

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 site 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.

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 & Human Health*
6. *Biodiversity*
7. *Ornithology*
8. *Land, Soils & Geology*
9. *Water*
10. *Air and Climate*
11. *Noise and Vibration*
12. *Landscape and Visual*
13. *Cultural Heritage*
14. *Material Assets (including Traffic and Transport, Telecommunications and Aviation)*
15. *Interactions of the Foregoing*
16. *Schedule of Mitigation*

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

Background to the Proposed Development

This chapter of the Environmental Impact Assessment Report (EIAR) presents information on renewable energy and climate change policy and targets, the strategic planning context for the Proposed Development, the site selection and design process, a description of the Proposed Development site and planning history, scoping and consultation, and the cumulative impact assessment process.

Energy and Climate Change 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. The June 2018 '*Off Target Report*' published by the Climate Action Network (CAN) Europe, which ranks EU countries ambition and progress in fighting climate change, listed Ireland as the second worst performing EU member state in tackling climate change. It also stated that Ireland is set to miss its 2020 climate and renewable energy targets and is also off course for its unambitious 2030 emissions target.

The Department of Climate Change, Action & Environment (DCCAE) reported in their '*Fourth Progress Report on the National Renewable Energy Action Plan*' December 2017 that Ireland will achieve 13% of its 16% RES target by 2020. SEAI in their report '*Ireland's Energy Targets - Progress, Ambition & Impacts*' (April 2016) estimates that Ireland's inability to achieve its 2020 renewable energy targets will result in fines of between €65 million and €130 million per percentage shortfall on its overall binding target after 2020 until it meets its targets. The latest data available from Eurostat show that as of the 2018 figures, Ireland is still considerably below meeting its 16% target and at the end of 2018 sat at 11.1%.

The SEAI's 'Energy in Ireland 2019' report provides the most up to date figures available (from 2018) in relation to energy production and consumption in Ireland. The 2019 report found that wind generation accounted for 28.1% (normalised) of all electricity generated, further, wind energy accounted for 84% of the renewable energy generated in 2018. In relation to the findings of this SEAI report it is clear that wind energy represents the strongest and most deployable renewable energy resource available to reduce

dependence on fossil fuels in Ireland. While it is clear that additional deployment is on-going, it is also apparent that it is unlikely that the 2020 targets for renewable electricity generation will be met.

Cork County Council Development Plan 2014-2020

The cork County Development Plan 2014-2020 is the principle instrument used to manage the County. The principal aim of the 2014 CCDP is to provide a blueprint for the development of County Cork. Cork County Council are commencing the preparation of a new County Development Plan (2022-2028), this process remains in the pre-draft stage at time of writing, with various background documents having been released to inform the public discourse.

It is a key aim of the CCDP is to ensure that sufficient energy and related infrastructure is available to meet the existing and future needs of County Cork, recognising the importance of exploiting the renewable energy resources of the County in order to reduce dependence on fossil fuels, improve security of supply, reduce greenhouse gas emissions helping to address the climate change challenge and creating environmental benefits while taking full advantage of the opportunities that will arise from the emerging renewable energy sector in terms of sustainable jobs and making a positive contribution towards the move to a competitive, low carbon green economy and enhancing national competitiveness.

The CCDP acknowledges the key strategic role Cork plays in energy provision in Ireland and recognises that energy generation and energy-related activity in Cork is likely to change significantly over the coming years, including the continuing movement towards a low carbon-based economy. The Plan further emphasises that the development of renewable energy sources is central to overall energy policy in Ireland and a key aim of the CCDP is to support the sustainable development of renewable energy sources. Accordingly, the following objectives are seen as key in aiding this transition whilst ensuring that energy demands are also met to sustain existing and future requirements, attracting inward investment and reinforce County Cork's position to becoming self-sufficient in renewable energy:

- **County Development Plan Objective ED 1-1:**
“Ensure that through sustainable development County Cork fulfils its optimum role in contributing to the diversity and security of energy supply and to harness the potential of the county to assist in meeting renewable energy targets”.
- **County Development Plan Objective ED 3-2:**
“Wind Energy Projects On-shore wind energy projects should focus on areas considered ‘Acceptable in Principle’ and Areas ‘Open to Consideration’ and generally avoid “Normally Discouraged” areas in this Plan”.
- **County Development Plan Objective ED 3-3:**
“Wind Energy Generation Support a plan led approach to wind energy development in County Cork and identify areas for wind energy development. The aim in identifying these areas is to ensure that there are no significant environmental constraints, which could be foreseen to arise in advance of the planning process”.

The development of renewable energy sources is central to overall energy policy in Ireland. It is noted that *‘renewable energy reduces dependence on fossil fuels, improves security of supply, and reduces greenhouse gas emissions, protection against climate change while delivering new jobs to the economy’*. The Plan aims to support the sustainable development of renewable energy sources. Section 9.3 of the Cork County Development Plan 2014 sets out the councils On-Shore Energy strategy.

The Plan identifies, in broad strategic terms, three categories of ‘Wind Deployment Area’ for large scale commercial wind energy developments. These categories are as follows:

- **‘Acceptable in Principle’:** These areas (River Ilen basin north of Skibbreen and an area south of Macroom) are in optimal locations for wind farm development without significant environmental impacts. They have viable wind speeds (>7.5m/s) and good proximity and access to the grid. These areas exclude urban areas and town green belts, avoid Natura 2000 Sites, high value landscapes and Natural Heritage Areas.
- **‘Open to Consideration’:** This area comprises almost 50% of the County area. Within these areas there are locations that may have the potential for wind farm developments but there are

also some environmental issues to be considered. This area has variable wind speeds and some access to the grid.

- **'Normally Discouraged':** These areas (coastal areas, some areas in North Cork, Cork Harbour and the Lee Valley) are normally not suitable for commercial wind farm developments due to their overall sensitivity arising from ecological, landscape, amenity, recreational and settlement considerations.

Contained within the Cork County Development Plan 2014-2020 are Plan Objectives corresponding to each of the above categories. These are as follows:

County Development Plan ED 3-4: Acceptable in Principle - Commercial wind energy development is normally encouraged in these areas subject to protection of residential amenity particularly in respect of noise, shadow flicker, visual impact and the requirements of the Habitats, Birds, Water Framework, Floods and EIA Directives.

County Development Plan ED 3-5: Open to Consideration - Commercial wind energy development is open to consideration in these areas where proposals can avoid adverse impacts on:

- Residential amenity particularly in respect of noise, shadow flicker and visual impact
- Urban areas and Metropolitan/Town Green Belts;
- Natura 2000 Sites (SPA and SAC), Natural Heritage Areas (NHAs) or adjoining areas affecting their integrity;
- Architectural and archaeological heritage;
- Visual quality of the landscape and the degree to which impacts are highly visible over wider areas.

County Development Plan ED 3-6: Normally Discouraged - Commercial wind energy developments will be discouraged in these areas which are considered to be sensitive to adverse impacts associated with this form of development (either individually or in combination with other developments).

General policy on landscape is covered in the CDP by the following objectives:

- **Objective GI 6-1: Landscape**
 Protect the visual and scenic amenities of County Cork's built and natural environment. Landscape issues will be an important factor in all landuse proposals, ensuring that a proactive view of development is undertaken while maintaining respect for the environment and heritage generally in line with the principle of sustainability.
 Ensure that new development meets high standards of siting and design.
 Protect skylines and ridgelines from development.
 Discourage proposals necessitating the removal of extensive amounts of trees, hedgerows and historic walls or other distinctive boundary treatments.
- **Objective GI 6-2: Draft Landscape Strategy**
 Ensure that the management of development throughout the County will have regard for the value of the landscape, its character, distinctiveness and sensitivity as recognised in the Cork County Draft Landscape Strategy and its recommendations, in order to minimise the visual and environmental impact of development, particularly in areas designated as High Value Landscapes, where higher development standards (layout, design, landscaping, materials used) will be required.

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 2.4 within this EIAR.

Scoping and Consultation

A comprehensive scoping and consultation exercise was undertaken during the preparation of this EIAR. This included: Circulation of a detailed Scoping Document, providing details of the application site, the Proposed Development and the proposed scope of the EIAR.

Pre-application consultations were also held with Cork County Council on the 17th of February 2020 in which the Proposed Development was introduced, detailed discussions were held with regards to the Proposed Development.

Considerable community consultations were also carried by the project team to best inform those closed to the development site. A community liaison officer was appointed early in the project to give the local community a point of contact with the project team. Door-to-door consultations were also carried out between January and April 2020. The full scope of the community consultation is provided under Section 2.6 and Appendix 2-3 of this EIAR.

Description of the Proposed Development

The layout of the Proposed Development has been designed to minimise the potential environmental effects of the development, while at the same time maximising the energy yield from the site. A constraints study, as described in Section 3.3.6 of this EIAR, has been carried out to ensure that turbines and ancillary infrastructure are located in the most appropriate areas of the site. The Proposed Development layout makes maximum use of the existing access tracks within the site.

The overall layout of the Proposed Development is shown on Figure 4-1 of the EIAR. This figure shows the proposed locations of the wind turbines and associated hardstand areas, electricity substation and associated battery storage compound, underground cabling, borrow pits, construction compound and access roads. Detailed site layout drawings of the Proposed Development are included in Appendix 4-1 to this EIAR.

The proposed wind turbines will have a tip height of up to 178.5 metres. Within this size envelope, various configurations of hub height, rotor diameter and ground to blade tip height may be used. The exact make and model of the turbine will be dictated by a competitive tender process, but it will not exceed a tip height of up to 178.5 metres. Each wind turbine is secured to a reinforced concrete foundation that is installed below the finished ground level.

It is proposed to develop 2 No. on-site borrow pit as part of the Proposed Development. It is proposed to obtain the majority of all rock and hardcore material that will be required during the construction of the Proposed Development from the on-site borrow pits. Usable rock may also be won from other infrastructure construction including the substation and the turbine base excavations.

Post-construction, should the borrow pit areas not be completely backfilled it will be permanently secured and a stock-proof fence will be erected around the borrow pit area to prevent access. Appropriate health and safety signage will also be erected on this fencing and at locations around the fenced area.

As detailed in Chapter 1, Section 1.4, it is proposed to construct one onsite electricity substation within the site of the Proposed Development. The proposed substation site is located at 508800, 562235 (ITM) within an area where forestry has been felled and is adjacent to the existing on-site substation as shown in Figure 4-1.

A battery storage compound is also proposed as part of the proposed electricity substation compound. The compound will consist of up to four metal containers (similar in appearance to shipping containers). The containers will typically measure up to 13.3m(L) x 2.4m(W) x 4.4m (H). Each of the containers will house a modular array of battery units, control systems and other electrical components.

Each turbine will be connected to the on-site electricity substation via an underground electricity cable. Fibre-optic cables will also connect each wind turbine to the wind farm control building in the onsite substation compound. The electricity and fibre-optic cables running from the turbines to the onsite

substation compound will be run in underground cable ducts approximately 1.3 metres below the ground surface.

A connection between the proposed substation and the national electricity grid will be necessary to export the electricity generated by the Proposed Development.

The Proposed Development will connect to the existing 38kV overhead line within the site. This overhead line connects into Ballylickey Substation, located approximately 12 kilometres southwest of the site. The connection will comprise of an internal underground cable, approximately 120m in length, which will connect the proposed substation to the existing overhead line infrastructure within the site.

One permanent anemometry mast is proposed as part of the Proposed Development. The anemometry masts will be equipped with wind monitoring equipment at various heights. The mast will be a slender structure up to 112 metres in height. The mast will be a free-standing structure. The mast will be constructed on a hard-standing area sufficiently large to accommodate the crane that will be used to erect the mast, adjacent to an existing track.

The construction compound will consist of temporary site offices, staff facilities and car-parking areas for staff and visitors. The compound will be located in the northern part of the site of the Proposed Development, south of T1.

A total of 11.73 hectares of forestry will have to be permanently felled within and around the footprint of the Proposed Development. An additional 4.59 hectares of trees will be required to be temporarily felled around all turbines in order to facilitate infrastructure construction and turbine erection. It is assumed, for the purposes of assessment within the EIAR, that another 25 hectares of trees will be required to be temporarily felled in order to prevent those trees causing a turbulence effect around the proposed turbine locations. If the amount of turbulence felling is determined to be greater or less prior to felling, this will not change the assessment. The total extent of turbulence felling required will be determined by the turbine manufacturer which will not be known until prior to the construction phase. The amount of tree felling required on the site is therefore approximately 41.32 hectares or 12% of the currently forested area within the site boundary. Figure 4-12 within Chapter 4, shows the extent of the area to be felled as part of the Proposed Development.

In line with the Forest Service's published policy on granting felling licences for wind farm developments, areas cleared of forestry for turbine bases, access roads, and any other wind farm-related uses will have to be replaced by replanting at an alternative site. The Forest Service policy requires replanting on a hectare for hectare basis for the footprint of the turbines and the other infrastructure developments. In the case of the area to undergo turbulence felling, there is a requirement for replanting on a hectare for hectare basis within the site plus an additional 10% offsite. Approximately 16.32 hectares of forestry will be replanted as a condition of any felling licence that might issue in respect of the Proposed Development. Replanting is a requirement of the Forestry Act and is primarily a matter for the statutory licensing processes that are under the control of the Forest service.

All proposed activities on the site of the Proposed Development will be provided for in an environmental management plan. A Construction and Environmental Management Plan (CEMP) has been prepared for the Proposed Development and is included in Appendix 4-3 of this EIAR.

The Proposed Development has the potential to have significant benefits for the local economy, by means of job creation, landowner payments and commercial rate payments. An important part of wind farm development, which Wingleaf Ltd. has been at the forefront of developing, is its Community Benefit Package. The concept of directing benefits from wind farms to the local community is promoted by the National Economic and Social Council (NESC) and the Irish Wind Energy Association (IWEA) among others. While it may be simpler and easier to put a total fund aside for a wider community area, Wingleaf Ltd. is endeavouring to develop new ways to direct increased gain towards the local community with particular focus on those living closest to the Proposed Development.

The routes of any natural drainage features will not be altered as part of the Proposed Development. Turbine locations have been selected to avoid natural watercourses. The proposed new access track to Turbine no. 6 will traverse a forestry drain as part of providing access to the turbine area. The crossing of this drain will be completed using a culvert system.

There will be no direct discharges to natural watercourses. For the wind turbines and associated infrastructure, all discharges from the proposed works areas or from interceptor drains will be made over vegetated ground at a minimum of 50m distance from streams and lakes, unless otherwise specified in future revisions of the drainage design. Buffer zones around the existing natural drainage features have informed the layout of the Proposed Development, and are indicated on the drainage design drawings. Where a 50m buffer has not been achieved from infrastructure on site, appropriate mitigation will be implemented to ensure protection of streams and lakes.

It is estimated that the construction phase of the Proposed Development will take approximately 12-18 months from starting on site to the commissioning of the electrical system. In the interest of breeding birds, construction will not commence during the bird breeding season which runs from the 1st of March to the 31st of August inclusive. Construction may commence at any stage from September onwards to the end of February, so that construction activities are ongoing by the time the next breeding bird season comes around, and can continue throughout the next breeding season.

The wind turbines proposed as part of the Proposed Development are expected to have a lifespan of approximately 30 years. Following the end of their useful life, the equipment may be replaced with a new technology, subject to planning permission being obtained, or the Proposed Development may be decommissioned fully. The onsite substation will remain in place as it will be under the ownership of the ESB/EirGrid. The battery storage compound will also remain and serve as permanent infrastructure for the national electricity grid.

Population & Human Health

One of the principle 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 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.

The Proposed Development site is located approximately 5.6km northeast of Kealkill and 5.5km southwest of the village of Ballingeary in County Cork.

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, and where relevant, nearby DEDs which may be affected by the Proposed Development. The site of the Proposed Development lies predominantly within Douce, while a small section in the northeast of the site is within the District Electoral Division of Béal Átha an Ghaorthaidh. Both of these DEDs will collectively be referred to hereafter as the Study Area for this chapter.

The Population Study Area has a population of 443 persons, as of 2016 and comprises a total land area of 208.4 km² (Source: CSO Census of the Population 2016).

The closest dwelling to the proposed Curraglass Renewable Energy Development is located approximately 760m from the nearest proposed turbine (T7), i.e. greater than the recommended setback distance (i.e. 4 times the tip height, 714m), as per the Draft Revised Wind Energy Development Guidelines (December 2019). These revised guidelines remain in draft from at the time of writing.

As stated above, approximately 70 jobs could be created during the construction, operation and maintenance phases of the proposed development with most construction workers and materials sourced locally, thereby helping to sustain employment in the construction trade. This will have a Short-Term Significant Positive Impact.

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. An indoor phenomenon, it 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 500 metres of a proposed turbine location should not exceed a total of 30 hours per year or 30 minutes per day.

There is a total of 23 No. sensitive receptors located within 10 rotor diameters (assumed at 1.5km) of the proposed turbine locations. The potential flicker that will occur at houses located within the area surrounding the Proposed Development was calculated using the WindFarm software package and a regional sun factor of 32.5% was applied to the annual shadow flicker prediction. It is predicted that there will be no exceedance of the annual shadow flicker guideline limit of 30 hours per year at any property. Of the 23 No. residential properties modelled; in the absence of mitigation measures 6 properties may experience daily shadow flicker in excess of the DoEHLG guideline threshold of 30 minutes per day. This prediction is assuming worst-case conditions (i.e. 100% sunshine on all days where the shadow of the turbines passes over a house, wind blowing in the correct direction, no screening present, etc.) and in the absence of any turbine control measures.

With the implementation of mitigation, No significant shadow flicker effects are associated with the operation of the site.

Impacts on human beings during the construction and operational phases of the Proposed Development are described in Chapter 5 in terms of health and safety, employment and investment, population, land-use, noise, dust, traffic, tourism, residential amenity, renewable energy production and reduction in greenhouse gas emissions, shadow flicker 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 beings within the Study 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 wind farm development is constructed and operated in accordance with the design, best practice and mitigation that is described within this application, significant effects on population and human health are not anticipated at international, national or county scale.

Biodiversity

The habitats, flora and fauna of the site 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 Proposed Development site is located in an upland area, within the townlands of Cappaboy Beg, Curraglass and Derreendonee. The proposed turning area upgrade is located approximately 1.7km to the north east of the site along the R548 road. The primary land use within the study area is commercial forestry with upland peatland habitats occurring in the wider study area. The site is also the location of a former operational wind farm. The Proposed Development footprint is dominated by modified habitats associated with the existing infrastructure and commercial forestry.

Dedicated ecological surveys of the Proposed Development were undertaken on the 29th and 30th of July 2019, 22nd, 23rd and 24th January 2020, the 25th of March and the 26th of May 2020. 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.

A total of thirteen habitats were recorded within the study area including Conifer Plantation/replanted forestry (WD4), Spoil and Bare Ground (ED2), Recolonising Bare Ground (ED3), Buildings and Artificial Surfaces (BL3), Wet Heath (HH3)/Upland Blanket Bog (PB2)/Exposed Siliceous Rock (ER1), Montane Heath (HH4), Oak-Birch-Holly Woodland (WN1), Dry-humid Acid Grassland (GS3), Wet Grassland (GS4), Scrub (WS1), Dense Bracken (HD1), Eroding/Upland Rivers (FW1) and Drainage

Ditches (FW4). The Proposed Development is largely confined to existing areas of hardstanding and conifer plantation within the site. The project has been specifically designed to avoid areas of Annex I peatland habitat.

There are a number of upland watercourses recorded within the Proposed Development site. A suite of best practice measures have been incorporated into the design of the Proposed Development to ensure there are no indirect impacts on these watercourses.

Third Schedule invasive species, Rhododendron (*Rhododendron ponticum*) was recorded to the north of the site outside the Proposed Development footprint. Best practice measures are in place to ensure no Third Schedule invasive plants are spread as a result of the Proposed Development.

Annex II and IV species Kerry Slug (*Geomalacus maculosus*) was recorded at various locations throughout the proposed development site. Site specific mitigation will be adhered to in order to ensure the protection of this species throughout the proposed works.

The Proposed Development is located approximately 24km south west of the The Gearagh SAC (000108) and 26km south west of the Gearagh SPA (004109) via hydrological distance. Conigar Bog NHA (002386) is located 5m from the north western corner of the site and approximately 980m from the nearest proposed infrastructure. There are a number of watercourses which drain from the Proposed Development site that provide hydrological connectivity with the River Lee. The River Lee flows in an eastward direction and discharges into Lough Allua pNHA 5.5km (6.9km hydrological distance) to the east of the development site boundary. Potential impacts in the form of surface water deterioration will be prevented in adherence to the mitigation described in Chapter 4 of the EIAR.

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

Provided that the Proposed Development is constructed and operated in accordance with the design, 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 is provided. This is followed by a comprehensive description of the methodologies that were followed in order to obtain the information necessary to complete a thorough assessment of the potential effects of the Proposed Development on bird species. The survey data is presented in full in the EIAR Appendices, with a summary of the information presented within this chapter. An analysis of the results is then provided, which discusses the ecological significance of the birds recorded within the study area. The potential effects of the Proposed Development are then described in terms of the construction, operation and decommissioning phases of the development. 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 identification of Key Ornithological Receptors and the assessment of effects followed a precautionary approach.

The potential for effects on designated sites is fully described in the Natura Impact Statement that accompanies this application. The findings presented in the NIS are that the Proposed Development, by itself or in combination with other plans and projects, in light of best scientific knowledge in the field, will not adversely affect the integrity of the relevant European sites and no reasonable scientific doubt remains as to the absence of such effects.

Based on the detailed 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 Long-term slight negative effect (EPA, 2017) and low effect significance (Percival, 2003).

The implementation of the prescribed mitigation measures will render any potential effects on avian receptors to low significance. In conclusion, no significant effects as a result of the Proposed Development are foreseen on key ornithological receptors of the study area.

Land, Soils and Geology

Measured peat depths in the area of the Proposed Development are typically shallow (<1m) with an overall average of 0.4m. The average peat depths at the proposed turbine locations varied between 0m (T1) to 0.87m (T5). Peats depths along the proposed new access roads were <0.5m.

The deeper peat areas across the site was avoided when optimising the wind farm layout. The peat deposits at the site are underlain by glacial tills or directly by bedrock.

The Proposed Development will typically involve removal of peat and subsoils (spoil) for access roads, internal road network, internal cable network, hardstanding emplacement, turbine foundations, substations, crane hardstands, compounds, met mast and the grid connection trench. Bedrock will be sourced from 2 no. on-site borrow pits.

Estimated volumes of peat, subsoil and bedrock to be excavated are in the region of 163,600m³. Excavated peat and spoil will also be used for reinstatement and landscaping works as close to the extraction point as possible. The handling and storage of peat and spoil will be done in accordance with the Peat & Spoil Management Plan (Appendix 4-4).

Storage and handling of hydrocarbons/chemicals will be carried out using best practice methods. Measures to prevent peat and subsoil erosion during excavation and reinstatement will be undertaken to prevent water quality impacts.

A Geotechnical & Peat Stability Assessment (Appendix 8-1) was undertaken for the site and it demonstrates an acceptable margin of safety, and that the site is suitable for the proposed wind farm development and is considered to be at low risk of peat failure. A number of control measures are given in the GDG peat stability assessment to manage all risks associated with peat instability.

No significant impacts on the land and soils and geology environment are anticipated during construction, operation, or during decommissioning phases of the Proposed Development.

The assessment confirms there will be no cumulative effects on land soil and geology environment as a result of the Proposed Development.

Water

In terms of regional surface water catchments, the Proposed Development site is located within the Owvane River and River Lee surface water catchments with 6 no. of the 7 no. proposed turbines being located in the Owvane River catchment.

On a more local scale, the eastern half of the site within the Owvane River surface water catchment drains directly into the Owvane River itself which flows in a southerly direction immediately to the southeast of the site. The western half of the site within the Owvane River surface water catchment drains towards the Lackavane River which flows southerly along a section of the western boundary of the site. The northern section of the site (which is located in the River Lee surface water catchment) drains directly via a small stream network into the River Lee upstream of Lough Allua.

Along with the local stream network, drainage within the site is mainly facilitated by forestry drains. The integration of the proposed wind farm infrastructure with the existing drainage in a manner that avoids water quality impacts in downstream water bodies is a key component of the wind farm design.

The bedrock underlying the site is classified as mainly poor in terms of well water yield potential. The bedrock has little or no open cracks which means groundwater movement within the aquifer is very localised. Groundwater at the site can be classed as sensitive in terms of potential impacts from the

Proposed Development. However, the majority of the bedrock is covered in peat which acts as a protective cover to groundwater quality. The low potential for pollutant travel within the bedrock groundwater makes surface water bodies such as streams more sensitive to pollution than groundwater at this site. There will be no impact on private wells as a result of the development.

Due to the nature of wind farm developments, being near surface construction activities, impacts on groundwater are generally negligible and surface water is generally the main sensitive receptor assessed during impact assessments. The primary risk to groundwater at the site would be from hydrocarbon spillage and leakages at the borrow pit or during refueling. These are common potential impacts to all construction sites (such as road works and industrial sites). These potential contamination sources are to be carefully managed at the site during the construction and operational phases of the development and measures are proposed within the EIAR to deal with these potential minor local impacts.

The Proposed Development site is not located within any designated conservation site. Designated sites downstream of the proposed site and that are hydrologically connected to the Proposed Development include the Gearagh SAC and Lough Allua pNHA. These designated sites can be considered very sensitive in terms of potential impacts. Comprehensive surface water mitigation and controls are proposed to ensure protection of all downstream receiving waters. Any introduced drainage works at the site will mimic the existing drainage regime thereby avoiding changes to flow volumes leaving the site.

Two methods will be employed to control drainage water within the site during construction, thereby protecting downstream surface water quality and aquatic habitats. The first method involves 'keeping clean water clean' by avoiding disturbance to natural drainage features, minimising any works in or around artificial drainage features, and diverting clean surface water flow around excavations and construction areas. The second method involves collecting any drainage waters from works areas within the site that might carry silt, to allow settlement and cleaning prior to its release. During the construction phase all runoff will be treated to a high quality prior to being released. There will be no risk of increased flooding down-gradient of the site as a result of the Proposed Development due to these drainage measures. Impacts on water quality during the construction phase of the wind farm will be imperceptible to none. A surface water monitoring programme will be put in place during the construction phase.

During the operational phase drainage control measures will ensure that surface runoff from the developed areas of the site will continue to be of good quality and will therefore not impact on the quality of down-stream rivers and streams. The present drainage regime of the site will not be altered in any way. No impacts on surface water quality are anticipated during the operational phase.

With respect to potential health effects, wind farms are not a recognized source of pollution and so the potential for effects during the construction, operational and decommissioning phase are negligible.

In terms of cumulative hydrological impacts on regional rivers arising from other wind farm developments, no significant effects are anticipated because there is only 1 no. turbine located in the River Lee surface water catchment and within the Owane River surface water catchment there are no existing windfarms and therefore the potential for future cumulative effects is very low due to the low turbine density.

With respect to cumulative effects arising from the wind farm construction and the grid connection, none are anticipated as the Proposed Development is proposing to connect to the national grid via the overhead line connection already established on-site to Ballylickey Substation located in the townland of Ballylickey, Co. Cork, thereby reducing the need for any off-site connection via local roads or adjacent lands.

In respect to the replanting lands assessed as part of the Proposed Development, these are located in Co. Clare and Co. Roscommon. Both sites are located outside the Owane River catchment meaning there is no potential for cumulative effects.

Overall, no significant impacts on the water environmental are anticipated during the construction, operation or decommissioning of the development.

Air and Climate

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 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 Framework Directive and Daughter Directives. The site of the Proposed Development lies within Zone D, which represents rural areas located away from large population centres.

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. Some minor short term or temporary indirect emissions associated with the construction of the wind farm include vehicular and dust emissions.

A Construction and Environmental Management Plan (CEMP) will be in place throughout the construction phase (see Appendix 4-3 of the EIAR). The CEMP includes dust suppression measures. Turbines and construction materials will be transported to the site on specified haul routes only. The agreed haul route roads adjacent to the site will be regularly inspected for cleanliness and cleaned as necessary.

Climate Change and Carbon Balance Calculations

Although variation in climate is thought to be a natural process, the rate at which the climate is changing has been accelerated rapidly by human activities. Climate change is one of the most challenging global issues facing us today and is primarily the result of increased levels of greenhouse gases in the atmosphere. These greenhouse gases come primarily from the combustion of fossil fuels in energy use. Changing climate patterns are thought to increase the 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.

In June 2019, the EPA published an update on Ireland’s Greenhouse Gas Emission Projections to 2040. The report includes an assessment of Ireland’s progress towards achieving its emission reduction targets out to 2020 and 2030 set under the EU Effort Sharing Decision (Decision No 406/2009/EU) and Effort Sharing Regulation (Regulation (EU) 2018/842).

Greenhouse gas emissions are projected to 2040 using 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 2017 (latest national greenhouse gas emission inventory) are implemented. The ‘With Additional Measures’ scenario assumes the implementation of the “With Existing Measures” scenario and further implementation of the governments renewable and energy efficiency policies including those set out in the National Renewable Energy Action Plan (NREA), the National Energy Efficiency Action Plan (NEEAP) and the National Development Plan 2018-2027.

The EPA Emission Projections Update notes the following key trends:

- > Total emissions are projected to increase from current levels by 1% and 6% by 2020 and 2030, respectively, under the “With Existing Measures” scenario.
- > Under the “With Additional Measures” scenario, emissions are estimated to decrease by 0.4% and 10% by 2020 and 2030, respectively.

- Ireland's non-Emissions Trading Scheme (ETS) emissions are projected to be 5% and 6% below 2005 levels in 2020 under the 'With Existing Measures' and 'With Additional Measures' scenarios, respectively. The target for Ireland is a 20% reduction.
- Ireland has exceeded its annual binding limits in 2016 and 2017 under both scenarios, 'With Existing Measures' and 'With Additional Measures'.
- Over the period 2013 – 2020, Ireland is projected to cumulatively exceed its compliance obligations by 10 Mt CO₂ (metric tonnes of Carbon Dioxide) equivalent under the 'With Existing Measures' scenario and 9 Mt CO₂ equivalent under the 'With Additional Measures' scenario.

The report concludes:

- "Projections indicate that Ireland will exceed the carbon budget over the period 2021-2030 by 52-67Mt CO₂ equivalent with the gap potentially narrowing to 7-22 Mt CO₂ equivalent if both the ETS and LULUCF flexibilities described in the Regulation are fully utilised."
- "To determine compliance under the Effort Sharing Decision, any overachievement of the binding emission limit in a particular year (between 2013 and 2020) can be banked and used towards compliance in a future year. However, even using this mechanism Ireland will still be in non-compliance according to the latest projections."
- "A significant reduction in emissions over the longer term is projected as a result of the expansion of renewables (e.g. wind), assumed to reach 41-54% by 2030, with a move away from coal and peat... [...] ... However, Ireland still faces significant challenges in meeting EU 2030 targets in the non-ETS sector and national 2050 reduction targets in the electricity generation, built environment and transport sectors. Progress in achieving targets is dependent on the level of implementation of current and future plans."

The carbon balance of proposed wind farm developments in peatland habitats has attracted significant attention in recent years. When developments such as wind farms are proposed for peatland areas, there will be direct effects and loss of peat in the area of the development footprint. There may also be indirect effects where it is necessary to install drainage in certain areas to facilitate construction. The works can either directly or indirectly allow the peat to dry out, which permits the full decomposition of the stored organic material with the associated release of the stored carbon as CO₂. It is essential therefore that any wind farm development in a peatland area saves more CO₂ than is released.

A methodology was published in June 2008 by scientists at the University of Aberdeen and the Macauley Institute with support from the Rural and Environment Research and Analysis Directorate of the Scottish Government, Science Policy and Co-ordination Division. The document, 'Calculating carbon savings from wind farms on Scottish peat lands', was developed to calculate the impact of wind energy developments on the soil carbon stocks held in peat. This methodology was refined and updated in 2011 based on feedback from users of the initial methodology and further research in the area. This provides a transparent and easy to follow method for estimating the impacts of wind farms on the carbon dynamics of peatlands. Previously guidance produced by Scottish Natural Heritage in 2003 had been widely employed to determine carbon payback in the absence of any more detailed methods.

The Macauley Institute method for calculating carbon losses from wind farm projects was used to assess the impacts of the proposed renewable energy development in terms of potential carbon losses and savings taking into account peat removal, drainage, habitat improvement and site restoration.

The worksheet made available as part of the 'Calculating carbon savings from wind farms on Scottish peat lands' report, was downloaded and used to input the necessary data. A copy of this worksheet is provided as Appendix 10-1 of this EIAR. Where available and relevant, site-specific information was inserted into the worksheet. Otherwise, default values were used.

The worksheet model calculates that the Proposed Development will give rise to 51,360 tonnes of CO₂ equivalent losses over its 30-year life. Of this total figure, the proposed wind turbines directly account for 26,115 tonnes, or 51%. Losses due to backup account for 17,798 tonnes, or 35%. Losses from soil organic matter and reduced carbon fixing potential and the felling of forestry accounting for the remaining 14% or 7,447 tonnes. It should be noted that forestry on the Proposed Development site forms part of a

commercial crop, which would be felled in coming years whether the Proposed Development proceeds or not.

Construction of the Proposed Development will have a Short-Term, Imperceptible Negative Effect as a result of greenhouse gas emissions from construction plant and vehicles. Operation of the Proposed Development will have a Direct Long-Term Moderate Positive Impact on climate as a result of reduced greenhouse gas emissions.

Noise and Vibration

AWN Consulting Limited has been commissioned to conduct an assessment into the likely environmental noise and vibration impacts of the proposed Curraglass Renewable Energy development.

The methodology adopted for assessing the noise impact of the wind energy development is based on the guidance in the document '*Wind Energy Development Guidelines for Planning Authorities*' published by the Department of Environment, Community and Local Government, which are based on the UK document ETSU-R-97 The Assessment and Rating of Noise from Wind Farms which describes a detailed method for deriving maximum values of wind turbine noise, when measured at an external location in the vicinity of a house. Maximum values, or limits, are primarily based on the background noise levels and how it varies with wind speed, in the absence of wind farm.

The background noise environment has been established through noise monitoring surveys undertaken at several noise sensitive locations (NSLs) surrounding the Proposed Development. Typical background noise levels for day and night periods at various wind speeds have been measured in accordance with best practice guidance contained in the Institute of Acoustics document '*A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise*' (IoA GPG). Prevailing noise levels are primarily attributable to wind noise in foliage, local road traffic noise and other agricultural and anthropogenic sources in the area.

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 construction phase and the long-term operational phase.

The assessment of construction 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 construction phase is not expected to exceed the recommended limit values. The associated noise and vibration are not expected to cause any significant effects.

Based on detailed information on the site layout, turbine noise emission levels and turbine height, worst-case turbine noise levels have been predicted at NSLs for a range of operational wind speeds. The predicted noise levels associated with the Proposed Development will be within best practice noise limits recommended in Irish guidance, therefore it is not considered that a significant effect is associated with the development.

Noise from replacement substation has also been assessed and found to be within the adopted criteria.

No significant vibration effects are associated with the operation of the site.

In summary, the noise and vibration impact of the Proposed Development is not significant in the context of current national guidance.

Landscape and Visual

The Zone of Theoretical Visibility (ZTV) map for the proposed Curraglass turbines generally shows a narrow band of intermittent theoretical visibility stretching from Bantry Bay in the south-west to the north-

east of the 20km study area. The ZTV shows that there will be no landscape or visual effect in County Kerry.

There will be local landscape effects by the introduction of vertical structures in the development site, however, the site has a history of wind energy development. The previous turbines were dismantled in June 2018

Three County Cork Landscape Character Types (LCTs) will have significant theoretical visibility of the proposed turbines, but only LCT 15a Ridged and Peaked Upland.

LCT 15a Ridged and Peaked Upland, where the turbines will be located and LCT 16a Glaciated and Forested Cradle Valley will experience 'Moderate' landscape effects. However, screening by topography and vegetation are significant mitigating factors.

There will be slightly more theoretical visibility in LCT 4 Rugged Ridge Peninsulas than in LCT 16a, but due to distance from the proposed turbines the landscape effects are considered 'Not Significant'.

Within the 20km study area existing and permitted wind turbines were identified and mapped in order to assess the cumulative landscape and visual effects. Although, it was found that the proposed turbines would slightly add to the cumulative landscape status in all the three LCTs that will have theoretical visibility, there will be no change in the cumulative landscape status.

Therefore, the cumulative landscape effects are considered Low in all the LCTs.

Key visual receptors, such as scenic routes and views, settlements, recreational destinations and routes as well as major transport routes were identified within the study area, after which those where visibility could be excluded due to ZTV mapping or sit surveys were screened out. The remaining visual receptors were selected as 12 viewpoints for which photomontages were prepared to assess the visual effects on the visual receptors. The visual assessment concluded that residual visual effects of "Moderate" was deemed to arise at one of the 12 viewpoint locations. All other viewpoints were assessed as resulting in Slight (7), Not Significant (4) or Imperceptible (4) residual visual effects.

Cumulative visual effects were assessed in terms of increase in spatial extent of turbines within the views of the selected viewpoints, visual separation of the proposed turbines from the permitted turbines and the perceived difference of scale between the existing/permitted turbines and the proposed turbines. The nearest existing or permitted turbines are at a distance of approximately 5 kilometres.

Existing or permitted turbines will only be visible in three of the 12 viewpoints. In all three of these viewpoints the cumulative visual effects are considered 'Low' due to the other turbines appearing in the far distance with clear visual separation. Hence cumulative visual effects overall are deemed 'Imperceptible'.

Cultural Heritage

Introduction and Methodology

The Cultural Heritage chapter comprises an assessment of the potential impact of the Proposed Development on the Cultural Heritage resource to include archaeology, architectural heritage and any other tangible assets. The methodology was based on GIS based mapping and analysis, Zone of Theoretical Visibility (ZTV) Maps used in the Landscape and Visual Assessment chapter as well as Viewshed analysis to assist with the assessment of impacts on setting. This was followed by a desktop analysis of all baseline data and a comprehensive programme of field inspection of the proposed infrastructure within the Proposed Development site boundary.

Monuments within the EIAR Site Boundary

In terms of known constraints, five recorded monuments (3 redundant) are located within the EIAR site boundary. The wind farm layout has taken their location into consideration in that no RMPs are within the footprint of any proposed infrastructure. No direct impacts to any of the aforementioned sites will

occur. Where required, as detailed within Chapter 13, a 30-metre buffer zone will be established prior to and during construction. A slight/moderate effect on setting will occur (Moderate being an effect arising where a change to an archaeological site is proposed which though noticeable, is not such that the integrity of the site is compromised and which is reversible. This arises where an archaeological site can be incorporated into a modern day development without damage and that all procedures used to facilitate this are reversible).

The sub-surface archaeological potential of the Proposed Development area is considered to be low taking into consideration that the entire original wind farm site was subject to full time archaeological monitoring during which time no features were uncovered. Furthermore, the Proposed Development is partly located on existing infrastructure (such as roads, hardstands, turbine bases etc). Archaeological monitoring will take place during construction of areas in undisturbed ground.

Indirect Effects on National Monuments

Indirect effects on the setting of National Monuments within 10km, RMPs within 5km and RPS/NIAH within 5km were included in order to assess impacts on setting in the wider landscape. The proposed turbines have the potential to impact on the setting of National Monuments in the wider landscape. In order to ascertain the degree of potential impact, both Viewshed Analysis and ZTV were utilised. Where an impact has been identified, they are considered to be slight mainly due to the intervening distance and the varying degrees of visibility (Slight impacts being described as ‘an effect which causes changes in the character of the environment which are not high or very high and do not directly impact or affect an archaeological site’. As it is not possible to mitigate the indirect effects of the turbines in the wider landscape setting there are no mitigation measures for this potential impact.

Indirect Effects on RMPs within 5km

All monument types within 5km of the nearest proposed turbines are discussed in Section 13.3.1.4 of the EIAR. Potential impacts on setting were identified through viewshed analysis or the Zone of Theoretical Visibility. Impacts on setting within the 5km study area vary from Imperceptible to Slight/Moderate. The degree of impact depends on the nature of the RMP and the proximity to the proposed turbines in particular those monuments that have associations with solar events such as summer and winter solstice (Stone circles, rows, single standing stones). There are no instances where any impacts on setting are significant or adverse.

Cumulative Effects on National Monuments within 10km

Cumulative effects were also assessed taking into consideration other windfarms within 20km. No indirect cumulative effects will occur on any National Monuments within 10km since there are no instances where both the Curraglass turbines and other project turbines can be seen from the National Monuments.

Cumulative impacts on RMPs within 5km

Within the 5km study area, in the wider landscape setting, the ability to view other turbines (permitted, proposed and existing) as well as the proposed Curraglass turbines is such that cumulative effects on setting of cultural heritage assets may occur. These cumulative effects are considered to be slight since the distance of other projects from the proposed Curraglass Renewable Energy development is in excess of 5km with the Grousemount turbines to the north being the nearest at 5km.

Material Assets

Traffic and Transport

Introduction

An assessment of the traffic effects of the proposed Curraglass Renewable Energy Development consisting of 7 turbines located in the townlands of Derreendonee, Curraglass and Cappaboy Beg in County Cork, was undertaken for both the construction and operational stages of the development. The

assessment considered the impact that the traffic generated by the Proposed Development would have on the local highway network, and also presents an assessment of the route geometry with respect to accommodating the abnormally sized vehicles required to deliver the turbine plant to the site.

Traffic Route & Study Area

Two route options for the delivery of the large turbine plant and general construction traffic were identified from the N22 National Road. Route Option 1, the preferred route for the abnormally sized loads, turns off the N22 at Crookstown and travels west on the R585 to Kealkill. Abnormally sized loads will then travel southwest on the R584 to make a turning manoeuvre at Ballylickey Bridge before travelling northbound on the R584 towards the site access. Route Option 2 turns off the N22 at Lisacressig and travels southwest on the L3402 to the village of Ballingearry. At the northern end of the village the route turns onto the R584 crossing 2 bridges while passing through the village. The route then continues in a southwestern towards the site entrance.

Vehicle types and network geometry

The types of vehicles that will be required to negotiate the local network will be up to 64.0 metres long with a blade length of 58.5 metres. An assessment of the geometric requirements of the delivery vehicles was undertaken on the preferred delivery routes. Locations where it was established that the existing road geometry will not accommodate all of the vehicles associated with the Proposed Development are highlighted, with the extent of remedial works indicated. In addition to the assessment presented, it is recommended that a dry run is undertaken by the transport company to check vertical and horizontal clearance on the transport route prior to construction.

Traffic impact on local network

In terms of daily traffic flows it is estimated that the impact of the development traffic on the delivery routes will be as follows:

- During the 7 days when the concrete foundations are poured the effect on the surrounding road network will be negative, resulting in an increase in traffic levels ranging from +1.8% on the N22 to an increase of +19.3% on the R585, and +18.3% on the R584 leading to the site. The direct effect will be temporary, and will be slight.
- During the remaining 248 days for the site preparation and ground works when deliveries to the site will take place, the effect on the surrounding road network will be negative, resulting in an increase in traffic levels ranging from +0.6% on the N22 to an increase of +5.5% on the R585, and +5.2% on the R584 leading to the site. On these days, the direct effect will be temporary and will be slight.
- During the 7 days of the turbine construction stage when general materials are delivered to the site, the delivery of construction materials will result in a negative impact on the surrounding road network, increasing traffic levels, ranging from +0.3% on the N22 to an increase of +3.5% on the R585, and +3.3% on the R584 leading to the site. The direct effect during this period will be temporary and will be slight.
- During the 19 days when the various component parts of the wind turbine plant are delivered to the site using extended articulated HGVs, the effect of the additional traffic on these days will be moderate due to the size of vehicles involved, resulting in increased traffic volumes of between 0.6% on the N22, 5.7% on the R585 to 5.2% on the R584 leading to the site. The direct effects, which will be temporary, may be reduced to slight if the delivery of the large plant is done at night, as is proposed.

Once the facility is operational the traffic impact created by maintenance staff will be negligible.

Telecommunications and Aviation

Wind turbines, like all large structures, have the potential to interfere with television or radio signals by acting as a physical barrier 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, i.e. television and radio

signals. The most significant effect however, at a domestic level, relates to a possible flicker effect caused by the moving rotor, particularly on television signals. The most significant potential effect occurs where the wind turbine(s) is directly in line with the transmitter radio path.

RTE Television Network Radio Telefís Éireann Transmission Network Ltd., now 2RN, responded by email on the 2nd May 2019. Having reviewed the location of the Proposed Development, 2rn noted a potential impact on television viewers to the southwest of the site. As a standard requirement, a protocol agreement was requested and signed. The Protocol Document ensures that in the event of any interference occurring to RTE television or radio reception due to operation of a wind farm, the required measures as set out in the document, will be carried out by the developer to rectify this. The Protocol Document ensures that the appropriate mitigation is carried out in the event of any unanticipated broadcast interference arising to RTE television or radio reception as a result of the Proposed Development.

As part of the scoping and consultation exercise, MKO contacted the relevant national and regional broadcasters, fixed and mobile telephone operators, aviation authorities and other relevant parties.

BT Communications Ireland responded on the 5th May 2019 confirming that the Proposed Development will have no impact on their network.

Eir Mobile (formerly Meteor) responded by email on the 2nd May 2019 confirming that that they have no transmission or radio services in the vicinity of the Proposed Development site with the nearest link over 1.3km away, which does not pose any risk to the Eir Mobile (formerly Meteor) network.

ESB Networks responded by email on the 7th May 2019 confirming the Proposed Development did not affect any of their current microwave links and noted satellite infrastructure on the existing substation within the site. ESB were then provided with coordinates for the Proposed Development in February 2020. At this stage, it was noted that there could be a potential impact on this satellite and a future proposed radio link from Kealkill 38kV to Nowen Hill. Discussions were had with ESB which involved looking at potential new turbine locations or including appropriate buffers around the link and satellite infrastructure as detailed in correspondence in Appendix 2-2. As a means of resolving the issue, the applicant agreed a telecommunications solution for the above noted infrastructure with EMR Solutions that was forwarded to ESB. These telecommunications solutions involved:

- Primary link: 20Mbps Microwave radio from met mast to Nowen Hill high site with a fibre connection from met mast to substation.
- Secondary (Resilient/Failover) link: Satellite broadband from existing substation.

As a result, the applicant was able to confirm that no turbine, with the potential to impact on the existing communications signal to the existing substation, will be built before the alternative solution outlined by EMR is in place.

Imagine Group responded on the 1st May 2019 noting that they have reviewed all sites that they are planning to deliver in the area and can confirm that no microwave links will be using the area within or surrounding the Proposed Development site, therefore having no impact on their network.

Ripplecom responded on the 3rd May 2019 noted no impacts, therefore no potential for adverse impacts to arise.

RTE Transmission Network Ltd responded on the 2nd May 2019 noting no issues with the Proposed Development. On the 4th March 2020, on providing RTE with a proposed turbine layout, there were issues with the location of T7 which was directly in the pathway of their Mullaganish and Bantry sites. Further discussions with RTE resulted in a movement of T7 out of the 200m Fresnel Zone associated with that link and therefore no impact on their network is anticipated.

Three Ireland responded on the 1st May 2019. They confirmed that Proposed Development will not impact the 3 Transmission Network. They noted that they have no microwave links that traverse the development area. Their closest link is approximately 1.32km south west of the development area and is itself directed south-east and therefore no impact on their network is anticipated.

Towercom responded by email on the 7th May 2019 and confirmed that the Proposed Development would not appear to have a significant impact on their sites. Turbine coordinates were sent to the operator with no response. No significant impact anticipated therefore no potential for adverse impacts to arise

Viatel Ireland Ltd responded on the 2nd May 2019. No links were identified in the area, therefore no potential for adverse impacts to arise.

MP&E Trading Company Ltd. responded on the 2nd May 2019 confirming they had no links within the Proposed Development area, therefore identifying no potential for adverse impacts. The Department of Defence also issued a response during the consultation exercise on the 19th December 2019, which requested that the applicant be conditioned to:

"In all locations where wind farms are permitted it should be a condition that they meet the following lighting requirements -

- *Single turbines or turbines delineating corners of a windfarm should be illuminated by high intensity strobe lights (Red).*
- *Obstruction lighting elsewhere in a windfarm will be of a pattern that will allow the hazard to be identified and avoided by aircraft in flight.*
- *Obstruction lights used should be incandescent or of a type visible to Night Vision Equipment. Obstruction lighting fitted to obstacles must emit light at the near Infra-Red (IR) range of the electromagnetic spectrum specifically at or near 850nanometres (nm) of wavelength. Light intensity to be of similar value to that emitted in the visible spectrum of light. Obstruction lights used should be incandescent or of a type visible to Night Vision Equipment."*

The Irish Aviation Authority (IAA) issued a response during the consultation exercise on the 23rd December 2019 and the 8th May 2020 which requested that the applicant be conditioned to:

- Agree an aeronautical obstacle warning light scheme for the wind farm development.
- Provide as-constructed coordinates in WGS84 format together with ground and tip height elevations at each wind turbine location.
- Notify the Authority of intention to commence crane operations with a minimum of 30 days prior notification of their erection
- All of the above requests will be complied with should the Proposed Development receive a grant of planning permission.

In summary, there will be no significant impact on telecommunications and aviation as a result of the Proposed Development.

Interactions of the Foregoing

Chapters 5 to 14 of this EIAR identify the potential significant environmental effects that may occur in terms of Population & Human Health, Biodiversity, Ornithology, Land, Geology and Soils, Water, Air and Climate, Noise and Vibration, Landscape and Visual, Cultural Heritage and Material Assets, as a result of the Proposed Development. All of the potential significant effects of the Proposed Development and the measures proposed to mitigate them have been outlined in the main EIAR. However, for any development with the potential for significant environmental effects there is also the potential for interaction between 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 Chapter 15 of the EIAR to identify interactions between the various aspects of the environment already discussed in the EIAR. The matrix highlights the occurrence of potential positive or negative impacts during both the construction and operational phases of the Proposed Development. Where any potential interactive impacts have been identified, appropriate mitigation is included in the relevant sections (Chapters 5–14) of the EIAR.