NON-TECHNICAL SUMMARY

Introduction

This Environmental Impact Assessment Report (EIAR) has been prepared by MKO on behalf of FuturEnergy Knockshanvo Designated Activity Company (the Applicant), who intends to apply to An Bord Pleanála (the Board) for planning permission to construct a wind energy development at Knockshanvo and adjacent townlands, located in County Clare.

The proposed wind energy development will comprise of 9 No. turbines with a limited tip height range of 179.5 metres to 185 metres and all associated foundations and hardstanding areas, access roads and entrance(s) including upgrade of existing site roads and provision of new roads, 110kV electrical substation and wind farm control building(s), underground cabling, borrow pit(s), electrical cabling for 110kV grid connection, amenity works, biodiversity enhancement areas, temporary construction compounds, a permanent meteorological mast, temporary transition compound and upgrades to roads along the turbine delivery route.

One planning application will be submitted to An Board Pleanála (the Board) seeking permission for the proposed 9 No. wind turbines and associated infrastructure with a potential generating capacity of greater than 50 megawatts (MW).

A second planning application will be submitted concurrently to the Board seeking permission for the 110kV underground cabling to Ardnacrusha 110kV electrical substation.

The Wind Farm planning application will include a design flexibility opinion from the Board to allow for a limited range of turbine dimensions.

Description of the Proposed Project

This section of the EIAR describes the development and its component parts (the 'Proposed Development') including the works subject of two proposed applications for planning permission to the Board. The full description of the Proposed Development i.e. Wind Farm and Grid Connection, as per the public planning notices, is as follows:

An Bord Pleanála – Planning Notice Project Description – Wind Farm Site

i. *Construction of 9 no. wind turbines with a blade tip height range from 179.5m to 185m inclusive, a hub height range from 102.5m to 110.5m inclusive and a rotor diameter range from 149m to 163m inclusive with associated foundations, hard-standing and assembly areas.*
ii. *Construction of 1 no. permanent 110 kV electrical substation including 2 no. control buildings, lightning protection, welfare facilities, car parking, and all associated electrical plant and apparatus, security fencing, external lighting, underground cabling, wastewater holding tank and all associated infrastructure, apparatus and landscaping;*
iii. *Underground electrical cabling (33kV) and communications cabling connecting the wind turbines to the proposed on-site 110kV electrical substation and associated ancillary works;*
iv. *Erection of 1 no. Meteorological Mast of 105 metres above existing ground level for the measuring of meteorological conditions, including a lightning rod which will extend above the mast ;*
v. *Construction of new permanent access roads and upgrade of existing roads to provide access within the site and to connect the wind turbines and associated infrastructure;*

vi. *Construction of 1 no. new permanent access to the site off the R465 regional road to serve as the sole entrance to the wind farm during its operational phase and to facilitate the delivery of the construction materials and turbine components to site during the construction, operational and decommissioning phases;*
vii. *Construction of 2 no. new permanent access points off the L-3042 and L-30144-0 local roads to facilitate traffic movement across the site during construction, operation and decommissioning phases. Both accesses will be gated and opened when required during the operational phase;*
viii. *Development of 5 no. borrow pits;*
ix. *Construction of 3 no. temporary construction compounds and associated ancillary infrastructure including temporary site offices, staff facilities and car-parking areas, all to be removed at end of construction phase;*
x. *Temporary works at 3 no. locations along the R465 regional road associated with the facilitation of turbine component and abnormal load delivery to site. These works will primarily include the trimming of vegetation and strengthening of road verges;*
xi. *Installation of a temporary transition compound to facilitate turbine blade delivery during the construction phase, within the townland of Court, Co. Limerick. The works will include installation of a temporary stone hard standing area and associated entrance and egress to and from the N69 national road and will be removed at the end of the construction phase.*
xii. *Permanent amenity works comprising the construction of 1 no. new marked trail, the development of 2 no. new viewing areas and upgrade to 1 no. existing viewing area, including the installation of associated signage and seating;*
xiii. *Permanent and temporary Site Drainage;*
xiv. *Operational Stage Site Signage;*
xv. *Ancillary forestry felling to facilitate construction and operation of the proposed development;*
xvi. *Biodiversity enhancement measures including the permanent clear-felling of land, and;*
xvii. *All related site works and ancillary development including landscaping considered necessary to facilitate the proposed development.*

This application is seeking a ten-year permission and 35 year operational life from the date of commissioning of the wind energy development.

An Bord Pleanála – Planning Notice Project Description – Grid Connection

i. *The provision of underground electrical cabling (110kV) from the proposed Knockshanvo Wind Farm development to the existing Ardnacrusha 110kV electrical substation to facilitate the connection to the national grid;*
ii. *Provision of 14 joint bays, communication chambers and earth sheath links along the proposed underground electrical cabling route;*
iii. *Permanent and temporary Site Drainage;*
iv. *Ancillary forestry felling to facilitate construction and operation of the proposed development;*
v. *Reinstatement of land, road and track surface above the proposed cabling trench;*
vi. *All related site works and ancillary development considered necessary to facilitate the proposed development.*

Current and future wind turbine generator technology will ensure that the wind turbine model, chosen for the Proposed Development, will have an operational lifespan greater than the 35 year operational life that is being sought as part of this application.

Modern wind turbine generators typically have an output of between 5.7 and 7.2MW. The export capacity of the Proposed Development will, therefore, range from a minimum of 51.3MW and a maximum of 64.8MW.

Applicant

The prospective applicant for the Proposed Development is FuturEnergy Knockshanvo Designated Activity Company (DAC). FuturEnergy Knockshanvo DAC is a wholly owned subsidiary of FuturEnergy Ireland Holdings. FuturEnergy Ireland are an Irish-owned, joint venture company with Coillte and ESB, which launched in November 2021. Combining the Irish State's strongest assets and expertise in renewable energy development, FuturEnergy Ireland's mission is to maximise the potential of our unique wind and land resources and accelerate Ireland's transformation to a low carbon energy economy.

Coillte's portfolio of proposed wind farm projects and its Renewable Energy division transferred to FuturEnergy Ireland in Q4 2021. FuturEnergy Ireland is part of the company's wider strategic plan and commitment to creating a sustainable future. ESB, through its Brighter Future strategy, is furthering its investment in and commitment to onshore wind generation in Ireland, one of the main technologies underpinning the clean electricity systems that will power our society into the future.

FuturEnergy Ireland's ambition is to develop more than 1GW of renewable energy capacity by 2030 and make a significant contribution to Ireland's commitment to produce 80% of electricity from renewable sources by the end of the decade. Using their knowledge and expertise, FEI aim to develop wind farms in a responsible manner with the support of local host communities thereby enabling Ireland, and its people, to combat climate change and contribute to a better, brighter world.

Need for the Proposed Project

Ireland faces significant challenges to its efforts to meet EU targets for renewable energy by 2030 and its commitment to transition to a low carbon economy by 2050. Further detail can be found in Chapter 2 of this EIAR.

The Proposed Development provides the opportunity to capture an additional part of County Clare's valuable renewable energy resource. If the Proposed Development were not to proceed, the existing land uses of coniferous forestry, biodiversity areas under Coillte management, public road corridor and third-party lands currently being used for agricultural and forestry would continue. The opportunity to harness the wind energy resource of County Clare's valuable renewable energy resource would be lost, as would the opportunity 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. The opportunity to generate local employment and investment and to diversify the local economy would also be lost.

Economic Benefits

The Proposed Development will have both long-term and short-term benefits for the local economy including additional income to local landowners, job creation, work opportunities for local businesses and service providers, local authority commercial rate payments and Community Benefit Scheme.

Additional commercial rate payments from the Proposed Development will be provided to Clare County Council each year, which will be redirected to the provision of public services within Co. Clare. 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 Development will create up to 90 jobs during the construction, operational and maintenance phases overall. During construction, additional employment will be created in the region through the supply of services and materials to the wind energy development. There will also be income generated by local employment from the purchase of local services i.e. travel, goods 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. 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. The Proposed Development has the potential to increase the generating capacity of the wind farm and therefore there will be greater community gain.

Purpose and Scope of the EIAR

The purpose of this EIAR is to document the current state of the environment on and in the vicinity of the Site and to quantify the likely significant effects of the Proposed Development on the environment. The compilation of this document serves 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.

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 Project*
3. *Considerations of Reasonable Alternatives*
4. *Description of the Proposed Project*
5. *Population and Human Health*
6. *Biodiversity (excluding Birds)*
7. *Ornithology*
8. *Land, Soils and Geology*
9. *Hydrology and Hydrogeology*
10. *Air Quality*
11. *Climate*
12. *Noise and Vibration*
13. *Cultural Heritage*
14. *Landscape and Visual*
15. *Material Assets (including Traffic and Transport, Telecommunications, Aviation and Utilities)*
16. *Major Accidents and Natural Disasters*
17. *Interactions of the Foregoing*
18. *Schedule of Mitigation Measures*

The planning applications are also accompanied by a Natura Impact Statement ('NIS').

Background to the Proposed Project

This section of the 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.

The policies and targets which have been put in place at the various levels of Government in relation to renewable energy and climate change illustrate the urgent need for renewable energy developments such as the Proposed Development to assist Ireland in meeting its national targets and European commitments in relation to climate change and decarbonisation.

The Proposed Development will comprise of 9 No. turbines with a limited tip height range of 179.5 metres to 185 metres and all associated foundations and hardstanding areas, access roads and entrance(s) including upgrade of existing site roads and provision of new roads, 110kV electrical substation and wind farm control building(s), borrow pit(s), electrical cabling for 110kV grid connection, temporary construction compounds, a temporary transition compound, amenity works, biodiversity enhancement areas, a permanent meteorological mast and upgrades to roads along the turbine delivery route.

The Grid Connection includes for underground 110kV electrical cabling from the proposed onsite 110kV electrical substation within the Wind Farm Site to the Ardnacrusha 110kV electrical substation in the townlands of Castlebank and Ballykeelaun, County Clare. The underground cable route measures approximately 9.2 km in length, located within existing forestry tracks and the public road corridor. New GIS Bay equipment will be required at Ardnacrusha 110kV electrical substation located within the existing GIS building to facilitate connection for the proposed Wind Farm.

A gradual shift towards increasing our use of renewable energy is no longer viable. There is an urgency now to ensure real change happens. 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 is heavily dependent on the importation of fossil fuels to meet its energy need. 81.6% of energy used in Ireland is imported from abroad, higher than the EU average of almost 57.5% (National Energy Security Framework 2023). 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. As such, expanding indigenous renewable energy supply is critical for energy security and price stability.

Local Planning Policy

It is considered that the Proposed Development is consistent with the policies and objectives of the Clare County Development Plan 2023-2029 and the Limerick City and County Development Plan 2022-2028.

Clare County Council Development Plan 2023-2029

The Clare County Development Plan 2023 – 2029 (CDP) was formally adopted by Elected Members of Clare County Council on March 9th, 2023. The CDP officially came into effect on April 20th, 2023, 6 weeks later. The CDP provides overall guidance for the proper planning and development of County Clare through the use of supporting policies and objectives.

The CDP recognises its position in supporting the delivery of meaningful action on climate change. Climate action is thus an important strategic objective of the CDP, with aims to achieve decarbonisation and climate resilience as a county. This has been reflected in Chapter 2 - Climate Action, in addition to other climate action and renewable energy related objectives introduced throughout the Plan.

The significance of climate change and the need for continued support / investment within renewable energy generation as part of the county's adaption strategy is captured within the strategic of the CDP's Climate Action Chapter:

> *Goal II: A county that is resilient to climate change, plans for and adapts to climate change and flood risk, is the national leader in renewable energy generation, facilitates a low carbon future, supports energy efficiency and conservation and enables the decarbonisation of our lifestyles and economy.*

Clare Renewable Energy Strategy

As reflected within the key goals of the CDP, Clare County Council wants to ensure that Co. Clare has the necessary land use and strategy framework in place to maximise the harnessing and use of its

renewable energy resources and inform and guide the planning process for future renewable energy development. The Clare Renewable Energy Strategy 2023-2029 (RES) was adopted as part of the CDP 2023 – 2029, includes the following vision of the RES:

> *"A County Clare that is the national leader in renewable energy generation which supports energy efficiency and conservation, and which achieves balanced social and economic development throughout the County and assists in achieving national climate change mitigation targets.*

Clare Wind Energy Strategy 2023-2029

The Interim Wind Energy Strategy (WES) for County Clare 2023-2029 was published in April 2023 and is incorporated into the CDP as Volume 6. The WES has been developed as a planning framework to support the implementation of wind developments in the county.

Within the preface of the WES it states:

> *The Clare Wind Energy Strategy forms part of the Clare County Development Plan 2023-2029. In accordance with the requirements of the Department of Environment, Community and Local Government as set out in Circular PL20-13, the previous "Clare Wind Energy Strategy 2017-2023" has not been reviewed as part of the preparation of this draft plan*
>
> *Circular PL20-13, dated 20th December 2013, in the cyclical review of a Development Plan it is advised that, until the national policy review processes have concluded in relation to the Wind Energy Development Guidelines and the Renewable energy Export Policy and Development Framework, local authorities should defer amending their existing Development Plan policies and should instead operate their existing Development Plan policies and objectives until the completion of these processes and further advice is issued."*

The proposed Wind Farm turbines are wholly located within an area designated primarily as a *'Strategic Area'* and also partially located within an area which is designated as *'Acceptable in Principle'* (AIP) as outlined in the WES. Strategic areas are considered suitable for wind farm development with good/excellent wind resources, access to grid, distance from properties and location outside designated sites. A target of minimum 400MW from these areas is identified in the WES. AIP areas are also considered suitable for wind farm development with sufficient wind speeds, access to grid and established patterns of inquiries. A target of a minimum of 150MW from these areas is identified in the WES. However, the Local Authority will assess each application for wind development in line with existing planning policy, objectives, and legislation.

The WES has remained largely unchanged since first published in 2009, in terms of the identified suitable areas and MW targets. Despite more than ten years passing since the current WES was first prepared and adopted, there has been no increase in the MW targets of the WES of the CDP. The 550MW (County Clare) and 400MW (Strategic Areas) targets remain in place and unchanged since 2009. As detailed in the preceding sections, the national and international policy context for renewable energy, wind energy and decarbonisation has changed dramatically in the same time period.

Only about 145 MW of wind energy projects have received permits or been constructed in the Strategic Areas of the WES, while about 81 MW have been permitted or developed in AIP areas to date. The Proposed Development would further deliver on the County's stated targets for these areas and is entirely consistent with the policies and objectives of the WES and CDP in contributing to the achievement of MW targets set out in those policy documents.

Limerick City & County Development Plan 2022-2028

The Limerick Development Plan 2022-2028 ('LCDP") was adopted on 17th June 2022 and came into effect on 29th July 2022 and Variation No. 1 to the Limerick Development Plan 2022 – 2028 was adopted by the Elected Members on the 22nd of May 2023. Chapter 9 of the LCDP outlines the Climate Action, Flood Risk and Transition to Low Carbon Economy within the Limerick Development Plan 2022-2028. The LCDP states:

> *"Limerick is committed to becoming a more climate resilient place and it is at the core of the Plan. Limerick City and County Council recognises the need for a shift away from the traditional methods and play its role as a key stakeholder in making the transition to a low carbon economy."*

A temporary transition compound is proposed near the N69 National Road in Court, Co. Limerick, to facilitate the unloading and delivery of turbine blades to the Wind Farm Site. This compound will operate only during the delivery phase, occurring primarily at night with Garda escorts, and is expected to involve approximately 15 days/nights of activity over three weeks. Previous planning decisions for wind farms with direct road access have set a precedent, establishing that traffic impacts are temporary and can be effectively mitigated. Policy TR 039 pertains specifically to 'new direct access point from a development', rather than the proposed temporary access which will be in place solely for the duration of turbine blade delivery to the Wind Farm Site, it is therefore considered that this policy is not directly applicable to the temporary transition compound. Nevertheless, there is a precedent set by An Bord Pleanála to permit planning applications for wind farms which include direct site access onto a national road. A detailed Traffic Management Plan will be prepared to ensure that the delivery process does not adversely affect road safety or capacity, ultimately concluding that the temporary access will not have any significant impact on the road network.

Wind Energy Development Guidelines

The relevant considerations under the 'Wind Energy Development Guidelines for Planning Authorities' (Department of the Environment, Heritage and Local Government (DOEHLG, 2006) hereafter referred to as 'the Guidelines', have been taken into account during the preparation of the EIAR.

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. While the Guidelines remain the relevant guidelines in place, at the time of lodgement, decision makers (Planning Authorities and An Bord Pleanála) are not bound to their provisions and they can (and do) consider updated standards/requirements/specifications in assessing impacts and the proper planning and sustainable development of the area.

The Department of Housing, Planning and Local Government published the Draft Guidelines in December 2019 and they remain in draft at the time of writing. The Draft Guidelines note that potential impacts of wind energy development proposals on the landscape, including the natural and built environment, must be considered along with the legitimate concerns of local communities.

The design of the Proposed Wind Farm has been designed in accordance with the Guidelines and has also been developed with the provisions of the Draft Guidelines in mind (for example in relation to 4 times turbine tip height set back distance from sensitive properties).

Planning History

A planning search was carried out through the National Planning Application Database and An Bord Pleanála's online planning portal in August 2024 for relevant planning applications lodged within the planning application boundaries of the Proposed Wind Farm and the Proposed Grid Connection.

A planning search was carried out to establish permitted, operational and proposed wind energy developments within 25km of the proposed turbines for the purposes of informing the potential cumulative effects. The search was carried out using the relevant local authority, An Bord Pleanála and EIA planning portals in August 2024 for relevant planning applications. In total, 7 no. applications relating to wind energy were identified within 25km of the proposed turbines, 2 no. of which relate to single turbine developments and a further 5 no. of which relate to larger multiple turbine wind farm developments.

Scoping and Consultation

Chapter 2 Section 2.6 of the EIAR presents detail of the EIA Scoping undertaken with regards to the Proposed Development. As part of the constraints mapping process, which is detailed in Chapter 3 of the EIAR, Ai Bridges were commissioned to evaluate the possible impacts that the proposed wind farm development at Knockshanvo, Co. Clare could have on existing telecommunications operator networks. Telecommunications operators, were initially contacted in October 2020 in order to determine the presence of telecommunications links or aviation assets traversing or located in close proximity to the Site. In August 2023, Ai Bridges undertook a new round of telecom operator consultations, to reflect the new 9-turbine layout. None of the Telecommunication Operators contacted during the consultation process raised any concerns regarding telecommunications networks operating in the licence-exempt frequency bands. Also there was no impacts reported by any of the telecommunications operators operating GSM Radio Access, Mobile Broadband Data Access, Tetra or Telemetry networks.

A scoping report, providing details of the Proposed Development, was prepared by MKO and circulated to prescribed statutory bodies in January 2023 with follow up scoping taking place in January 2024. The scoping document provided details of the Proposed Development and set out the scope of work for the EIAR. Consultees were invited to contribute to the EIAR by suggesting baseline data, survey techniques and potential impacts that should be considered as part of the assessment process and in the preparation of the EIAR.

Chapter 2 Section 2.6 of the EIAR includes details of the pre-planning meetings undertaken prior to the planning application being lodged with the following stakeholders:

- The relevant planning authority Clare County Council under the provisions of Section 247 of the Planning and Development Act 2000, as amended.
- An Bord Pleanála under the provisions of Section 37B, 37CC(1) and Section 182E of the Planning and Development Act 2000, as amended respectively.

Community engagement has been undertaken by the applicant, details of which can be found in Appendix 2-4 of this EIAR. A number of newsletters have been created and distributed to the public in November 2022, April 2023 and July 2023 to keep the community updated on the project's progress and benefits. In October 2023, an information webinar was conducted for the Proposed Development, presenting an overview of the project as well as highlighting the need for renewable energy and providing an opportunity for participants to ask questions about the Proposed Development. In November 2023, a live virtual tour as well as a detailed brochure was issued and delivered to homes within 4km of the proposed turbines. A community clinic was held in late November to give stakeholders the opportunity to meet the Knockshanvo team and discuss any aspect of the Proposed Development. A detailed Community Report has also been prepared to record the consultation carried out with the local community in respect of the Proposed Development, ensuring that the views and concerns of all were considered as part of the Proposed Development design and Environmental

Impact Assessment (EIA) process. The report outlines the consultation and community engagement initiatives undertaken by the applicant prior to the submission of the planning application. It also outlines the main issues identified during this process, how the final proposal reflects community consultation and the steps taken to ensure that the Proposed Development will be of enduring economic benefit to the communities concerned., ultimately aiming to deliver lasting economic benefits to the local area.

Cumulative Impact Assessment

The EIA Directive and associated guidance documents state that as well as considering any direct, indirect, secondary, transboundary, short-, medium-, and long-term, permanent and temporary, positive and negative effects of a proposed development or 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. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to a proposed development or project. The factors to be considered in relation to cumulative effects include population and human health (including Shadow Flicker), biodiversity, ornithology, land, soil and geology, water, air, climate, noise and vibration, material assets, landscape, cultural heritage and major accidents and natural disasters as well as the interactions between these factors.

To gather a comprehensive view of cumulative impacts on these environmental considerations and to inform the EIA 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 plans and/or projects has therefore been fully considered within this EIAR. The cumulative impact assessment of projects has three principle aims:

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

Assessment material for this cumulative impact assessment was compiled on the relevant plans and/or projects within the various cumulative impact study areas of each discipline for the Proposed Project. The material was gathered through a search of relevant online Planning Registers, reviews of relevant EIAR (or historical EIS) documents, Planning Registers and EIA Portal, planning application details and planning drawings, and served to identify past and future plans and/or projects, their activities and their environmental impacts.

Geographical boundaries within which there may be potential for cumulative impacts to arise, relative to each individual EIAR topic (i.e. each chapter) is set out within the Chapter. To gather a comprehensive view of cumulative impacts within the cumulative study areas for each discipline and to inform the EIA process being undertaken by the competent authority, each relevant chapter within the EIAR addresses the potential for cumulative effects where appropriate and within the context of their identified cumulative study area. A long list of all plans and/or projects considered by each of the different disciplines in their cumulative impact assessment are included in Appendix 2-2 of the EIAR.

Consideration of Reasonable Alternatives

This section of the EIAR contains a description of the reasonable alternatives that were studied by the Applicant, which are relevant to the Proposed Development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the environmental effects. The

consideration of alternatives typically refers to alternative design, technology, location, size and scale. A 'Do-Nothing Alternative' i.e., an outline of what is likely to happen to the environment should the Proposed Development not be implemented, has also been considered.

Alternative Locations

The process of identifying a suitable wind farm site is influenced by a number of factors. Site selection for the development of a wind farm must be suitable for consideration under a number of criteria, such as:

- **Planning Policy** - The Wind Farm Site is located within an area designated primarily as a 'Strategic Area' with the site also partially located within an area which is designated as 'Acceptable in Principle'
- **Proximity of Existing Grid Infrastructure** - The Wind Farm Site is located within relatively close proximity (c. 10km) of 2 no. existing electrical substations and therefore a wind energy development at this location has multiple options for connection to the national electricity grid.
- **Designated Sites** - There are no Natura 2000 or nationally designated sites located within the Proposed Development boundary.
- **Average Wind Speeds** - With the upland nature of the landscape, the Wind Atlas shows that wind speeds on the Wind Farm Site range from 7.5m/s to 9.25m/s at a 100m elevation. Such wind speeds indicate that this site is viable for commercial wind energy development.
- **Population Density** - The population density of the Population Study Area as described in Chapter 5: Population and Human Health of this EIAR is 24.22 persons per square kilometre. This is significantly lower than the average national population density of 73.27 persons per square kilometre.

The Knockshanvo site is located within an existing commercial forestry property which allows the site to take advantage of existing access roads. This, when combined with the relatively close proximity of the existing 110kV Ardnacrusha electrical substation and 110kV Drumline electrical substation, and associated electricity transmission infrastructure, further highlights the suitability of the site as it can make further sustainable use of these established items of infrastructure.

The Knockshanvo site does not overlap with any environmental designations and is also located in an area with a very low population density, relative to the national average, with viable annual wind speeds.

Alternative Renewable Energy Technologies

Both onshore and offshore wind energy development will be required to ensure Ireland reaches the target set in the Climate Action Plan to source 80% of our electricity from renewable energy by 2030. When considering other renewable energy technologies in the area, the Applicant considered commercial solar energy production as an alternative on the proposed Wind Farm.

In order to supply the same number of households with electricity per year as the Wind Farm Site, a solar PV array would require a potential installed capacity of between 184.7 MW and 233.3 MW, thus requiring a development footprint approximately 8 times the Wind Farm Site (At 0.7ha per MW for Solar PV, to achieve the same electricity output as the Wind Farm, between 129ha and 163ha would be required.

Alternative Turbine Numbers and Model

The proposed wind turbines, for the purpose of the assessments within this EIAR, will each have a potential power output in the 5.7 to 7.2 megawatt (MW) range. It is proposed to install 9 turbines at the

site which could achieve a minimum output of 51.3 MW and a maximum output of 64.8 MW. Such a wind farm could also be achieved on the proposed Wind Farm Site by using smaller turbine technology (for example 2.5 MW machines). However, this would necessitate the installation of between 21 no. and 26 no. turbines to achieve a similar output range. Furthermore, the use of smaller turbines would not make efficient use of the wind resource available having regard to the nature of the Wind Farm Site. The use of alternative smaller turbines at this site would not be appropriate as they would fail to make the most efficient use of the wind resource passing over the site. Furthermore, the increased use of materials, excavation and movement of peat and increase in visual effect associated with a larger number of smaller turbines would result in a higher level of negative environmental effects than the chosen option.

Alternative Turbine Layout and Development Design

The design of the Wind Farm Site has been an informed and collaborative process from the outset, involving the designers, developers, engineers, environmental, ecological, hydrological and geotechnical, archaeological specialists and traffic consultants. The aim of the process being to reduce the potential for environmental effects while designing a project capable of being constructed and viable.

Following the mapping of all known constraints described above, detailed site investigations were carried out by the project team. The ecological assessment of the site encompassed habitat mapping and extensive surveying of birds and other fauna. These assessments, as described in Chapters 6 Biodiversity and Chapter 7 Ornithology of this EIAR, informed the decision on the siting of turbines and the carrying out of any development works, such as the construction of roads. The hydrological and geotechnical investigations of the site examined the proposed locations for turbines, roads and other components of the Proposed Development, such as the substation, borrow pits and the construction compounds. Where specific areas were deemed as being unsuitable (e.g., due to sensitive habitat, unmapped watercourse, poor ground conditions) for the siting of turbines or roads, etc., alternative infrastructure locations within the Wind Farm site were proposed and assessed, taking into account the areas that were already ruled out of consideration. The turbine layout for the Wind Farm Site was also informed by wind data and the results of noise and shadow flicker assessments as they became available.

The final proposed turbine layout takes account of all site constraints (ecology, ornithology, geology, hydrology, cultural heritage, telecommunications and aviation, and design constraints (setback distance from dwellings and third-party lands/infrastructure and distances between turbines on-site). The layout also takes account of the results of all site investigations and baseline assessments that have been carried out during the EIAR process.

Alternative Grid Connection Cabling Route Options

The Wind Farm Site will connect to the national grid via underground 110kV electrical cabling, located primarily within the public road corridor. Underground medium voltage electrical cables will transmit the power output from each wind turbine to the proposed onsite 110kV electrical substation, and from there to the existing Ardnacrusha 110 kV electrical substation, via an underground 110kV electrical cabling route, measuring approximately 9.2 km in length.

The preferred Grid Connection route (Grid Route Option 5) is a single circuit UGC route connecting an onsite substation in the east of the Wind Farm Site to the existing Ardnacrusha 110kV substation. The Ardnacrusha substation is located approximately 7.7km south of the onsite substation. The UGC route runs within the public local road networks, existing access tracks, private forestry access tracks and private lands. There is a total of 7 no. identified watercourse and existing culvert/drain crossings along this UGC route; 2 no. of which are EPA/OSI mapped crossings, and the remaining are classified as culverts over minor channels or manmade drains.

Alternative Transport Route and Site Access

Wind turbine components (blades, nacelles and towers) are not manufactured in Ireland and therefore must be imported from overseas and transported overland to the proposed Wind Farm. Alternative ports of entry were considered and with regard to the selection of a transport route to the Proposed Development, in relation to the turbine delivery route and associated site access locations.

The alternatives considered for the port of entry of wind turbines into Ireland for the Proposed Development included Port of Galway, Shannon Foynes Port and Dublin Port. Shannon Foynes Port is the principal deepwater facility on the Shannon Estuary and caters for dry bulk, break bulk, liquid and project cargoes. Port of Galway and Dublin Ports also offer a roll-on roll-off procedure to facilitate import of wind turbines. All three ports and indeed others in the state, offer potential for the importing of turbine components. The primary chosen port of entry is Shannon Foynes due to its proximity and accessibility from the port to the national and regional roads towards the Proposed Development.

2 no. temporary transition compound (TTC) locations were considered as part of the design process. Option A and Option B are both located adjacent to the N69 National Secondary Road, in the townland of Court, Co. Limerick. Option A is located to the north of the N69 and Option B is located to the south of the N69. The TTC required a long straight stretch of road and therefore the location of these sites on the N69 National Secondary was optimum. Given the turning requirements of the Super Wing Carrier and that the vehicles will be travelling from Foynes Port, Option A was selected as the preferred location.

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 limits the potential for environmental effects. As noted above, the site layout aims to avoid environmentally sensitive areas. Where loss of habitat occurs within the site, this has been mitigated by proposing enhancement lands as described in Chapter 6 Biodiversity and Chapter 7 Ornithology of this EIAR. Any forestry felled as part of the Proposed Development will be replaced offsite, with no net loss. The alternative to this approach is to encroach on the environmentally sensitive areas of the site and accept the potential adverse environmental effects associated with this.

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. These mitigation measures are proven effective. 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 feasible.

Description of the Proposed Project

This section of the EIAR describes the development and its component parts (the 'Proposed Development') including the works subject of two proposed applications for planning permission to An Bord Pleanála.

The overall layout of the Proposed Development is shown on Figure 4-1 of Chapter 4. The layout for the Wind Farm Site application under Section 37E of the Planning and Development Act 2000, as amended, is shown in Figure 4-1a of Chapter 4. The layout for the Grid Connection Application under Section 182A of the Planning and Development Act 2000, as amended, is shown in Figure 4-1b of Chapter 4. All elements of the overall project, comprising works on the Wind Farm Site, and the Grid Connection route to Ardnacrusha 110kV electrical substation have been assessed as part of this EIAR.

The proposed wind turbine layout has been optimised using industry standard wind farm design software to maximise the energy yield from the site, while maintaining sufficient distances between the

proposed turbines to ensure turbulence and wake effects do not compromise turbine performance. The Grid Reference coordinates of the proposed turbine locations are listed in Table 1-1 below.

Table 1-1 Proposed Wind Turbine Locations and Elevations

Turbine No.	Irish Transverse Mercator Co-ordinates		Top of Foundation Elevation (m OD)
	Easting (m)	Northing (m)	
1	553306	669420	248
2	553422	670076	232.5
3	553812	669851	266.5
4	556212	669444	221.5
5	556663	670001	191.5
6	556896	669601	180.5
7	556727	669042	176
8	558463	669913	186
9	558864	669557	196.5

The proposed wind turbines to be installed on the Wind Farm Site will have a ground-to-blade tip height, hub height and blade length within the following, limited, ranges:

- Turbine Tip Height – Maximum height 185 metres, Minimum height 179.5 metres
- Hub Height – Maximum height 110.5 metres, Minimum height 102.5 metres
- Blade Length: - Maximum length 81.5 metres, Minimum length 74.5 metres.

Modern wind turbines from the main turbine manufacturers have evolved to share a common appearance and other major characteristics, with only minor cosmetic differences differentiating one from another. The wind turbines that will be installed on the Wind Farm Site will be conventional three-blade turbines, which will be geared to ensure the rotors of all turbines rotate in the same direction at all times.

The Wind Farm planning application will include a design flexibility opinion from the Board to allow for a limited range of turbine dimensions under Section 37CC(1) of the PDA (case reference ABP-319151-24). The certain details include the following:

- Turbine Dimensions
  - Turbine Tip Height
  - Rotor Diameter
  - Hub Height

It is anticipated the proposed wind turbine will have a rated electrical power output in the range of 5.7 to 7.2 megawatt (MW) depending on further wind data analysis and power output modelling. Therefore, the potential installed capacity of the proposed wind farm will range from a minimum of 51.3 MW up to a maximum 64.8 MW. Turbines of the exact same make, model and dimensions can also have different power outputs depending on the capacity of the electrical generator installed in the turbine nacelle.

Assuming an installed capacity of 64.8 MW, the Proposed Development therefore has the potential to produce up to 204,353 MWh (megawatt hours) of electricity per year. The 204,353 MWh of electricity produced by the Proposed Development would be sufficient to supply 48,656 Irish households with electricity per year, based on the average Irish household using 4.2 MWh of electricity.

It is proposed to access the Wind Farm Site via a newly proposed access track off the R465 regional road to the east of the site. This entrance will be created to facilitate the delivery of the construction materials and turbine components. As construction, operational and decommissioning traffic travels through the internal layout all traffic requiring to access turbines Nos 1 to 7 will require to cross the L-3042 at Location 29 indicated in Figure 15-1c in Chapter 15. Similarly, all traffic requiring access to turbines Nos 1 to 3 will require to pass through the junctions with the local roads at Locations 30 and 31.

The Proposed Development maximises the use of the existing onsite access roads and tracks where possible, with approximately 3.36 kilometres of existing roadway/ tracks requiring upgrading and approximately 9.3 kilometres of new access road to be constructed. The Grid Connection is located predominately within existing forestry tracks and the public road corridor.

It is proposed to construct one 110 kV electricity substation within the Wind Farm Site. The proposed onsite 110kV electrical substation will have 2 no. control buildings, associated electrical plant and equipment, a wastewater holding tank and will be constructed in accordance with EirGrid substation specifications and requirements.

Each turbine will be connected to the on-site electricity substation via an underground 33 kV (kilovolt) electricity cable. Fibre-optic cables will also connect each wind turbine to the wind farm control buildings in the onsite substation compound. The electricity and fibre-optic cables running from the turbines to the onsite substation compound will be run in cable ducts approximately 1.3 metres below the ground surface, in the roadways.

One 105m metrological mast with a lightening mast on top is proposed as part of the Proposed Development. The met mast will be equipped with wind monitoring equipment at various heights.

It is proposed to develop 5 No. on-site borrow pits as part of the Proposed Development. It is proposed to obtain approximately 60% 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. Some aggregate material due to a requirement for specific grade, quality or quantity may be sourced from suitable licenced quarries around the site.

3 no. temporary construction compounds are proposed for the Wind Farm Site to avoid excessive movements around the site. Construction compound 1 and 2 each measure approximately 68 metres by 45 metres and 3,060 square metres in area, located in the western and central sections of the site, adjacent to the existing access road, approximately 125 metres north of Turbine No. 3, and approximately 155 metres west of Turbine No. 6, respectively. Construction compound 3 measures approximately 104 metres by 60 metres and 6,240 square metres in area is proposed for the east of the site, adjacent to the proposed new access road approximately 65 metres to the west of Turbine No. 9, and approximately 700 metres east of the electricity substation. Temporary port-a-loo toilets located within a staff portacabin will be used during the construction phase. Wastewater from staff toilets will be directed to a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to wastewater treatment plants.

The Proposed Development will provide approximately 1.4km of a dedicated amenity trail in the form of a new track within and connecting to the 12 O'Clock Hills Trailhead. This amenity trail in the townlands of Snaty (Wilson) and Snaty (Massy) will allow walkers to relocate from the existing trail on the public road, into the forest environment, thus increasing the appeal and safety of the existing trail.

Two new viewing areas and one upgrade to an existing viewing area will be provided by the Proposed Development. The new viewing area will be placed along the northern end of the existing 12 O'Clock Hills' Fairy Trail, while upgrades will be made to the existing viewing area at the Lower Summit of Knockanuarha. Seating, signage and fixed binoculars are proposed for these two viewing areas, where there will be long-ranging views available.

Works such as road widening are sometimes required along proposed turbine transport routes to accommodate the large vehicles used to transport turbine components to wind farm sites. The proposed transport route for the Proposed Development has been the subject of a route assessment to determine if any widening works are required along its length. Full details of the locations described below are shown in Figure 15-1b in Chapter 15. A temporary transition compound is proposed adjacent to the N69 National Secondary Road, in the townland of Court, Co. Limerick, to facilitate turbine blade delivery. The compound measures approximately 200m along the N69 and 60m in width. Turbine components are generally transported at night when traffic is lightest and this is done in consultation with the roads authorities and An Garda Síochána, and special permits are generally required.

Some of the proposed Wind Farm Site is occupied by commercial forestry. As part of the Proposed Development, tree felling will be required within and around the development footprint to allow the construction of turbine bases, bat buffers, access roads, and the other ancillary infrastructure.

It is proposed to manage any peat and spoil generated through construction activities locally within the Site, in identified borrow pits and landscaping areas, as shown in Figure 4-1 of Chapter 4 of his EIAR.

A drainage design for the Proposed Project, incorporating all principles and measures outlined in this drainage design description, has been prepared, and is included in Appendix 4-4 to this EIAR. The drainage design employs the various measures further described below and is cognisant of a number of guidance documents as detailed in Section 4.5.3 of Chapter 4 of this EIAR.

A Biodiversity Management Plan (BMP) has been prepared and included in Appendix 6-5. The BMP will serve to offset the loss of 0.9ha of wet heath, 0.45ha of oak-ash-hazel woodland and 920m of hedgerow/treeline associated with the Proposed Development. The plan provides for sufficient habitat restoration to ensure no net permanent loss of these habitats occur. A total of 1,170m of linear hedgerow and treeline habitat is proposed which will result in a net gain of approximately 290m in the linear landscape features within the Wind Farm Site. In addition, a total of 54.2ha of compensation lands is being proposed for the benefit of hen harrier. A further 46.5ha of upland grassland and peatland is also proposed for enhancement and safeguarding for foraging hen harrier.

The planning application for the Proposed Development comprises the connection to the national electricity grid from the proposed onsite 110kV electrical substation at the eastern end of the Wind Farm Site to the existing Ardnacrusha 110kV substation via underground cabling, measuring approximately 9.2 km in total, located within the public road corridor and forestry tracks for the entirety of the route. New Gas Insulated Switchgear (GIS) bay equipment will be required at Ardnacrusha 110kV electrical substation located within the existing GIS building to facilitate connection for the proposed Wind Farm.

It is estimated that the construction phase of the Proposed Project will take approximately 18-24 months from commencement of civil works to the full commissioning of the wind turbines.

The Proposed Development is expected to have a lifespan of 35 years. Planning permission is being sought for a 35-year operation period commencing from the date of full operational commissioning of the wind farm. 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.

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. Turbine hardstands and foundations will remain in place underground and will be left to revegetate naturally. Leaving the turbine hardstands and 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.

The onsite 110kV electrical substation and 110kV electrical cabling will remain in place as it will be under the ownership of the ESB and will form a permanent part of the national electricity grid.

Population and Human Health

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, indirect or cumulative effects arising from the construction, operation and decommissioning of a development. Ultimately, the impacts of a development have the potential to impinge on human health, directly and indirectly, positively and negatively. The key issues examined in Chapter 5 of the EIAR include population, human health, encompassing employment and economic activity, land-use, residential amenity (noise, visuals, setbacks), community facilities and services, tourism, property values, shadow flicker and health and safety.

The Wind Farm Site is located approximately 3 km south of Broadford, 3.5 km southeast from Kilkishen, and 4 km northeast from Sixmilebridge, Co. Clare. The Grid Connection will originate from the proposed onsite 110kV electrical substation and will be connected to the national grid via an underground 110kV electrical cabling to Ardnacrusha 110kV electrical substation.

There are 15 no. residential dwellings located within one kilometre of any proposed wind turbine location. A minimum separation distance of 751m from the wind turbine (T06) to the nearest point of any occupied, residential dwelling (H492) has been achieved with the project design.

Land-use on the Wind Farm Site comprises coniferous forestry, biodiversity areas under Coillte management and third-party lands currently being used for agricultural and forestry. Current land-use along the Grid Connection comprises of public road corridor and coniferous forestry. Land-use in the wider landscape comprises a mix of agriculture, low density residential and commercial forestry.

The design, construction and operation of the Proposed Development will provide employment for technical consultants, contractors, and maintenance staff. Approximately, 80-100 jobs will be created during the construction, operation, 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 Proposed Development. The construction phase of the Proposed Development will last between approximately 18 – 24 months.

There is currently no peer reviewed 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 presumption based on the available international literature that the provision of a wind farm at the proposed location would not significantly impact on the property values in the area.

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.

When considering the amenity of residents in the context of a proposed wind farm, there are four main potential effects of relevance: 1) Shadow Flicker, 2) Noise, 3) Visual Amenity and 4)

Telecommunications. Shadow flicker and noise are quantifiable aspects of residential amenity while visual amenity is more subjective.

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 current guidance for shadow flicker in Ireland is derived from the Guidelines and the '*Best Practice Guidelines for the Irish Wind Energy Industry'* (Irish Wind Energy Association, 2012).

The Guidelines set out a threshold of 30 hours per year or 30 minutes per day of shadow flicker at sensitive receptors within 500 metres of a proposed turbine location. As set out in the Guidelines, there is a low probability of any shadow flicker effects occurring beyond 10 rotor diameters. A study area of 10 rotor diameters was assessed for shadow flicker effects. In this case, the rotor diameter proposed for this project is 163m. As such, the shadow flicker study area in this case is 1.63km. A significant minimum separation distance of 751m from sensitive receptors has been achieved with the project design.

The proposed wind turbines to be installed on the Wind Farm Site will have a ground-to-blade tip height, hub height and blade length within the following, limited, ranges:

- Turbine Tip Height: Maximum height 185 metres, Minimum height 179.5 metres
- Hub Height: Maximum height 110.5 metres, Minimum height 102.5 metres
- Blade Length: Maximum length 81.5 metres, Minimum length 74.5 metres.

A comparative assessment was undertaken where turbines with alternative dimensions within the proposed size range as detailed above were modelled and compared in order to determine which combination of dimensions would cause the largest effects of shadow flicker (i.e., precautionary scenario) on dwellings.

There is a total of 78 No. residential dwellings located within a distance of 10 rotor diameters (assessed at 1.63km) from the proposed turbine locations.

The potential shadow flicker occurring at sensitive receptors located within the Shadow Flicker Study Area was calculated using the ReSoft WindFarm computer software and a regional sunshine factor of 30.56% was applied. Of the 78 no. properties modelled, it is predicted that 31 no. properties may experience daily shadow flicker in excess of the Guidelines 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.

Of the 78 no. properties modelled, when the regional sunshine average (i.e., the mean amount of sunshine hours throughout the year) of 30.56% and is taken into account, the total annual guideline limit of 30 hours is predicted as being exceeded at 4 no. of the properties. However, this prediction does not consider wind direction or screening provided by intervening vegetation and topography.

Where daily or annual shadow flicker exceedances are experienced, suitable mitigation measures as outlined in Chapter 5 will be employed at the potentially affected properties to ensure that the limits set out in the Guidelines are not exceeded at any sensitive receptor within the Shadow Flicker Study Area. It is also noted that the applicant has committed to a zero shadow flicker policy, subject to the time needed to allow the safe shut down of the turbine.

Impacts on human beings during the construction, operational and decommissioning 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 is identified, appropriate mitigation measures will be put in place to ensure that there will be no significant health effects on sensitive receptors in the surrounding area.

Biodiversity

Chapter 6 of the EIAR assesses the likely significant effects (both alone and cumulatively with other projects) that the Proposed Development may have on biodiversity, and sets out the mitigation measures proposed to avoid, reduce or offset any potential significant effects that are identified.

To inform the assessment, a comprehensive desk study and suite of field surveys have been carried out. Multidisciplinary walkover surveys and targeted habitat and species surveys were undertaken on multiple dates between 2021 and 2024. Habitat surveys of the Proposed Development Site covered the recognised optimum period for vegetation surveys/habitat mapping, i.e. April to September (Smith *et al.*, 2011). Dedicated species/habitat specific surveys including for bats, protected mammals and detailed habitat assessment surveys were carried out, during which any incidental records of other species were also recorded (bird surveys are discussed in the section below). In addition, fisheries surveys and aquatic macroinvertebrate surveys have been undertaken as part of the detailed baseline assessment, the detailed results of which are provided in technical appendices to this EIAR.

The ecological surveys comprehensively covered the lands within the EIAR Site Boundary and based on the survey findings, further detailed targeted surveys were carried out for features and locations of ecological significance. These surveys were carried out in accordance with NRA Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes (NRA, 2009), CIEEM best practice competencies for species surveys (CIEEM, 2013[1]) and relevant Irish Wildlife Manuals (NPWS) for high value habitat types found within the site. 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 also conducted.

The habitats on the Site were the subject of a detailed survey and assessment and habitat mapping. This habitat mapping and assessment was undertaken following the '*A Guide to Habitats in Ireland*' (Fossitt, 2000). Peatland habitats have also been categorised according to the Irish Vegetation Classification system as well as vegetation communities described in the National Survey of Upland Habitats (Perrin et al. 2014, Irish Wildlife Manual no. 79).

The Proposed Wind Farm Site is dominated by commercial conifer plantations, which are dominated by mature stands but also comprise semi-mature stands, recently replanted areas and recently felled areas. Due to the upland nature of the Proposed Wind Farm Site, the majority of watercourses within the site are eroding in nature, typical of headwaters and as such are categorised as eroding/upland rivers. There are some areas of Annex I wet heath, dry siliceous heath and upland blanket bog within the EIAR Site Boundary. These areas were identified early in the design stage of the Proposed Development and the site layout has been designed to avoid these habitats where possible, with the exception of a fragmented and degraded area of wet heath which has been planted with commercial forestry. The majority of the lands on either side of the road along the length of the Proposed Grid Connection route (which is restricted to the existing road) include grassy verges, improved agricultural grasslands, hedgerows, treelines, and private dwellings and sheds. As the Grid Connection approaches the Ardnacrusha electrical substation, it follows a smaller track adjacent to areas of amenity grassland and groves of mature trees, and areas of scrub.

[1] *CIEEM, 2013, Technical Guidance Series – Competencies for Species Survey, Online, Available at: https://cieem.net/resource/competencies-for-species-survey-css/ Accessed: 19.10.2023*

The construction of the Proposed Wind Farm will result in the direct loss of approximately 107.5ha of commercial conifer plantation. This habitat is assessed as being of local importance (lower value), the loss of which is not considered significant at any scale given the prevalence of this habitat in the wider area and its lack of species diversity. The Proposed Grid Connection route will not result in the permanent loss of any habitat. The construction of the Proposed Development will result in the loss of approximately 920m of hedgerow and treeline habitat, 0.45ha of oak-ash-hazel woodland (peripheral to conifer plantation) and 0.9ha of degraded wet heath. However, a Biodiversity Management Plan is in place as part of the Proposed Development. This Plan sets out measures to plant 1.7km of hedgerow/treeline habitat and replanting of 0.9ha of oak-ash hazel woodland within the Proposed Development Site. The Biodiversity Management Plan also includes for the reversion of forestry within the EIAR Site Boundary to peatland which will link up existing areas of wet heath and upland blanket bog and result in a net gain in peatland habitat. The measures proposed in the Biodiversity Management Plan will provide benefits for both hen harrier and lesser horseshoe bat (Appendix 6-5 of the EIAR).

Bat species composition found at the Proposed Development site was typical of the geographic location and habitats present, which primarily include conifer plantation forestry. Bats as an ecological receptor have been assigned Local Importance (Higher value) on the basis that the habitats within the site are utilized by a regularly occurring bat population of Local Importance. The Proposed Development site is located in proximity of two European Sites designated for the protection of Lesser horseshoe bats (Danes Hole, Poulnalecka Special Area of Conservation (SAC) and Ratty River Cave SAC). This species has been recorded foraging and commuting across the site, with activity peaks considered high during transitional periods in Autumn and Spring. The populations associated with the designated roosts are likely to utilise the site as it is within or in close proximity of their core foraging ranges (2.5km); therefore, the Lesser horseshoe population recorded on the site has been assigned International Importance. Following the implementation of mitigation, no potential for residual significant effects with regard to loss of commuting and foraging habitat, loss or damage to roosts, displacement or other construction phase impacts have been identified. In relation to potential collision risk and injury with operational turbines, a bespoke adaptive monitoring and mitigation strategy has been devised for the Proposed Development in line with NatureScot (2021) Guidance, which will ensure that there is no potential for significant residual effects on local bat populations during the operational phase of the Proposed Development.

Evidence of otter activity was found in the form of an otter print within the EIAR Site Boundary and in the form of spraint along the larger watercourses downstream of the Proposed Development site. However, no otter holts or other resting places were recorded during any of the ecological surveys. There is no potential for direct loss or fragmentation of significant otter habitat including loss of breeding or resting places. All proposed watercourse crossings along the Grid Connection are within or under existing bridge and culvert crossings. Proposed internal water crossing structures associated with wind farm access roads (5 new and 1 existing) will be constructed using bottomless and clear-span culverts, therefore there are no instream works proposed with regard to access roads or the Grid Connection. Given that no otter holts or resting places were recorded within the EIAR Site Boundary, no direct mortality or any barrier to the movement of otter is anticipated. Furthermore, as part of embedded mitigation for the Proposed Development, the majority of wind farm infrastructure is located at least 50m away from natural watercourses. Given the likely presence of otter within the Proposed Development site, a potential for temporary significant effect as a result of disturbance was found on a precautionary basis and mitigation measures have been prescribed such that no residual significant effect is predicted.

Badger and pine marten activity was recorded within the EIAR Site Boundary in the form of scat and mammal trails. Direct observations of red squirrel as well as feeding remains were also recorded. However, following targeted surveys within the footprint and surrounding areas of the Proposed Development, no breeding or resting places of badger, pine marten or red squirrel were recorded. Therefore, no potential for significant effect as a result of habitat loss or direct mortality is predicted. However, on a precautionary basis, mitigation to avoid the potential for significant effect as a result of

disturbance has been prescribed and include pre-commencement surveys of the Proposed Development site for these species.

There is no suitable habitat for Marsh Fritillary within the footprint of the Proposed Development. Devil's bit scabious (*Succisa pratensis),* the foodplant of the caterpillar of this species, is present within the peatland area within the EIAR Site Boundary to the north, adjacent to Gortacullin Bog Natural Heritage Area (NHA). The habitats throughout the rest of the EIAR Site Boundary do not contain a sufficient amount of Devil's Bit Scabious to support the species. Furthermore, there will be no loss of any areas containing the foodplant as a result of the Proposed Development.

Common frog was observed on occasion within the EIAR Site Boundary, however no potential for impacts on these species were identified. Smooth newt, Atlantic salmon, lamprey, European eel, otter, and eDNA of white-clawed crayfish was recorded within watercourses downstream of the EIAR Site Boundary. However, mitigation measures with regard to protection of water quality during construction and operation of the Proposed Development are prescribed such that no potential for residual significant effect is predicted. As detailed above, there is no potential for direct impacts to these species.

No residual significant effects on surface water quality, groundwater quality or the hydrological/ hydrogeological regime were identified during construction, operation, or decommissioning. No significant effects as a result of drainage effects to nearby designated sites or on local peatlands was identified. A full hydrological assessment in relation to the Proposed Development has been carried out in Chapter 9 of the EIAR.

In relation to nationally designated sites, Gortacullin Bog NHA, Danes Hole, Poulnalecka proposed Natural Heritage Area (pNHA) and Cloonlara House pNHA were identified as being within the Likely Zone of Influence and are assessed in the EIAR. In addition, the following nationally designated sites are downstream of the Proposed Development and are also assessed in the EIAR: Doon Lough NHA, Castle Lake pNHA, Fergus Estuary and Inner Shannon – North Shore pNHA and Inner Shannon Estuary – South Shore pNHA.

In relation to European designated sites, the potential for adverse effects on Danes Hole, Poulnalecka SAC, Ratty River Cave SAC, Lower River Shannon SAC and River Shannon and River Fergus Estuaries Special Protection Area (SPA) has been fully assessed within the Appropriate Assessment Screening and Natura Impact Statement (NIS) that accompanies this planning application along with this EIAR. The NIS has been prepared to provide the competent authorities with the information necessary to complete an Appropriate Assessment screening and an Appropriate Assessment for the Proposed Development in compliance with Article 6(3) of the Habitats Directive. The NIS concludes that the Proposed Development, individually or in-combination with other plans or projects, will not adversely affect the integrity of any European Site.

It is therefore judged that, 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 ecology are not anticipated at the international, national, county, or local scales or on any of the identified Important Ecological Features.

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 (KORs) and the assessment of effects follow a precautionary approach.

The potential for effects on designated sites 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 construction, operation and decommissioning of the Proposed Development will not adversely affect the integrity of any European sites.

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 moderate negative effect (EPA, 2022) and low effect significance (Percival, 2003). With the exception of hen harrier, for which long-term significant negative effect (EPA, 2022) and high effect significance (Percival, 2003) were predicted. However, as detailed in Section 7.8, of Chapter 7 of this EIAR, a robust compensation and enhancement plan is proposed to reduce the magnitude of the impact from long-term significant negative effect (EPA, 2022) and high effect significance (Percival, 2003) to long-term slight negative effect (EPA, 2022) 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.

Lands, 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.

Wind Farm Site

The Wind Farm Site is located ~4km northeast of the village of Sixmilebridge, ~3km south of the small village of Broadford and ~3.5km southeast of Kilkishen in southeast Co. Clare. The Wind Farm Site is elongated along the crest of a hill and is dominated by coniferous forestry plantations. Topography of the Wind Farm Site is highly variable, ranging from ~160 to 310mOD (metres above Ordnance Datum).

Based on the peat depth information for the Wind Farm Site, the peat is shallow with depths ranging from 0 to 3.9m with an average peat depth of 0.55m. The peat deposits are underlain by glacial tills or lie directly on bedrock. The glacial tills generally consist of slightly sandy slightly gravelly SILT/CLAY with cobbles and boulders and/or silty SAND and/or GRAVEL with cobbles and boulders. In terms of bedrock geology, the Wind Farm Site is underlain predominantly by Old Red Sandstones (undifferentiated) which were encountered during the site investigations.

The Proposed Development will typically involve removal of peat, subsoils (spoil) and the excavation of bedrock for the construction of the internal cable network, hardstanding emplacement, turbine foundations, crane hardstands, construction compounds and met mast foundations.

Estimated volumes of peat and spoil to be excavated are in the region of 211,100m^3. Excavated peat and spoil will also be used for reinstatement and landscaping works as close to the extraction point as possible or will be stored in the proposed onsite borrow pits. The handling and storage of peat and

spoil will be done in accordance with the Peat and Spoil Management Plan which is included as Appendix 4-2 to the EIAR.

Estimated volumes of rock to be excavated is in the region of 251,000m^3. This rock will be excavated at the proposed borrow pit locations and along access roads and for the construction of turbine foundations. The rock will be reused on site to facilitate the construction of the Proposed Development.

A Geotechnical and Peat Stability Assessment was undertaken for the Wind Farm Site (Appendix 8-1) and it demonstrates an acceptable margin of safety, that the Wind Farm Site is suitable for the Proposed Development and is considered to be at low risk of peat failure. A number of control measures are prescribed in the peat stability assessment to manage all risks associated with peat instability. All of the detailed control measures will be implemented in full.

The handling of hydrocarbons/chemicals will be carried out using best practice methods. Measures to prevent soil and subsoil erosion during excavation, reinstatement and long-term storage will be undertaken to prevent erosion and potential water quality impacts.

The Turbine Delivery Route extends from Foynes Port to the Wind Farm Site. Works are proposed at a total of 4 no. locations along the route. 3 no. locations involve minor roadworks whilst a temporary construction compound will be constructed along the N69 in the townland of Court.

Minor excavation of soils and subsoils will be required at these work locations. Storage and handling of hydrocarbons/chemicals will be carried out using best practice methods. Measures to prevent soil and subsoil erosion during excavation, reinstatement will be undertaken to prevent water quality impacts.

No significant effects on the land, soil and geology on the site of the Turbine Delivery Route will occur during construction, operation, or during decommissioning phases.

An assessment of the construction phase, operational phase and decommissioning phase has been completed, along with a cumulative assessment for each phase. Based on the above, and with implementation of the prescribed mitigation measures, no significant effects on the land, soils and geology environment will occur as a result of the Proposed Development.

Grid Connection

The Grid Connection extends from the proposed onsite substation within the Wind Farm Site to the existing Ardnacrusha substation. The Grid Connection is located along existing forestry roads and in the public road corridor. The overall length of the Grid Connection is 9.2km.

Excavation of soil and subsoil will be required to accommodate the underground electrical cabling however, the excavated material will be reinstated within the trench. Storage and handling of hydrocarbons/chemicals will be carried out using best practice methods. Measures to prevent soil and subsoil erosion during excavation, reinstatement will be undertaken to prevent water quality impacts.

No significant effects on the land, soil and geology on the site of the Grid Connection will occur during construction, operation, or during decommissioning phases.

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

Hydrology and Hydrogeology

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

Wind Farm Site

The surface of the Wind Farm Site is drained by a network of forestry drains that are typically spaced every 15 to 20m. The forestry drainage network discharges into several natural streams which are sourced from the area of the Wind Farm Site.

Regionally, the Wind Farm Site is located across 2 no. regional surface water catchments. The east and south of the Wind Farm Site is located in the Lower Shannon surface water catchment and drains to the Blackwater River. Meanwhile, the northwest of the Wind Farm Site is located in the Shannon Estuary North surface water catchment and drains to the Owenogarney River. All watercourses draining the Wind Farm Site and Grid Connection eventually discharge into the Shannon Estuary.

Due to the nature of wind farm developments, being near surface construction activities, effects on groundwater are generally negligible and surface water is generally the main sensitive receptor assessed during impact assessments. The primary risk to groundwater would be from oil spillage and leakages at turbine foundations or during construction plant refuelling. 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 Proposed Development 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.

During each phase of the Proposed Development (construction, operation, and decommissioning) a number of activities will take place at the proposed site, some of which will have the potential to significantly affect the hydrological regime or water quality at or downstream of the Wind Farm Site. These significant potential effects generally arise from sediment input from runoff and other pollutants such as hydrocarbons and cement-based compounds.

Surface water drainage measures, pollution control and other preventative measures have been incorporated into the project design to minimise significant impacts on water quality and downstream designated sites. A self-imposed 50m stream and lake buffer was used during the design of the Proposed Development, thereby avoiding sensitive hydrological features. The surface water drainage plan will be the principal means of significantly reducing sediment runoff arising from construction activities and to control runoff rates. The key surface water control measure is that there will be no direct discharge of wind farm runoff into local watercourses or into the existing drainage network. This will be achieved by avoidance methods (i.e. stream buffers) and design methods (i.e. surface water drainage plan). Preventative measures also include fuel and concrete management and a waste management plan which will be incorporated into the Construction and Environmental Management Plan (CEMP).

No significant impacts to surface water (quality and flows) and groundwater (quality and quantity, and any local groundwater wells) will occur as a result of the Proposed Development with the implementation of the prescribed mitigation measures. This EIAR chapter presents proven and effective mitigation measures to mitigate the release of sediment which will reduce the concentration of suspended solids to acceptable levels. The storage and handling of hydrocarbons/chemicals will be carried out using best practice methods which will ensure the protection of surface and groundwater quality. The Proposed Development drainage system will be designed to slow surface water runoff from the proposed site by providing greater attenuation. This will ensure that the Proposed Development does not alter downstream surface water flows and will not contribute to downstream flooding.

A hydrological assessment of potential impacts on local designated sites was undertaken. Following implementation of the appropriate mitigation measures as outlined in the EIAR no significant impacts on any downstream designated sites will occur as a result of the Proposed Development.

A Water Framework Directive (WFD) Compliance Assessment has been completed for all waterbodies (surface water and groundwater bodies) with the potential to be impacted by the Proposed Development. With the implementation of the mitigation measures detailed in this EIAR there will be

no change in the WFD status of the underlying groundwater body or downstream surface waterbodies as a result of the Proposed Development. The Proposed Development has been found to be fully compliant with the WFD. The Proposed Development will not cause a deterioration of the status of any water body under the WFD and will not undermine the attainment by any such body of 'Good' status.

An assessment of potential cumulative effects associated with the Proposed Development and other developments on the hydrological and hydrogeological environment has been completed. With the implementation of the mitigation measures detailed in this EIAR, the cumulative assessment found that there will be no significant cumulative effects on the hydrological and hydrogeological environments.

No significant effects on the water environment will occur during the construction, operation or decommissioning of the Wind Farm.

Turbine Delivery Route

The Turbine Delivery Route extends from Foynes Port to the Wind Farm Site. Works are proposed at a total of 4 no. locations along the route. 3 no. locations involve minor roadworks whilst a temporary construction compound will be constructed along the N69 in the townland of Court.

Minor excavation of soils and subsoils will be required at these work locations. Storage and handling of hydrocarbons/chemicals will be carried out using best practice methods. Due to the shallow and minor nature of the works and with the implementation of the prescribed mitigation measures there will be no effects on surface of groundwater quality.

A flood risk assessment completed for the Proposed Development revealed that the proposed temporary construction compound along the N69 is mapped within 1 in 100-year fluvial flood zone and the 1 in 10-year coastal flood zones. However, given that the compound will only be present for a short period of time (~8 months) and it unlikely that a fluvial/coastal flood event of this magnitude will occur during the period when the compound is present. Furthermore, the compound has a very limited footprint in comparison to the overall flood zones (the footprint equates to 0.2% of the modelled flood zones). Flood displacement calculations have shown that in the event that the compound was completely submerged by a flood event, that it would have an imperceptible effect on flood levels (~3mm rise in water levels across the flooded area).

No significant effects on the hydrological and hydrogeological environment will occur.

Grid Connection

The Grid Connection from the proposed onsite 110kV substation to the existing Ardnacrusha 110kV substation is 9.2km and is located entirely along existing forestry tracks and in the local public road corridor.

The Grid Connection is located with the Lower Shannon surface water catchment with a total of 4 no. crossings over EPA mapped watercourses. The Lower River Shannon SAC is located downstream of the Grid Connection. Due to the minor and transient nature of the proposed works, coupled with the prescribed mitigation measures, there will be no significant effects on water quality or downstream designated sites.

Approximately 1.4km of the Grid Connection is underlain by a Regionally Important Karst Aquifer in the vicinity of Ardnacrusha. However, due to the minor, shallow and transient nature of the works, the lack of any mapped karst features in the vicinity of the Grid Connection and the prescribed mitigation measures, there will be no significant effect on karst features or the underlying karst aquifer. Furthermore, due to the minor, shallow and transient nature of the works and the prescribed mitigation measures, there will be no significant effect on any local well supplies.

An assessment of the construction, operational and decommissioning phases has been completed, along with a cumulative assessment for each phase. Based on the above, and with implementation of the outlined mitigation measures, no significant effects on the surface water and groundwater environments will occur.

Air Quality

Chapter 10 of the EIAR identifies, describes and assesses the potential significant direct and indirect effects on air quality arising from the construction, operation and decommissioning of the Proposed Development.

The 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 within 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 CAFE Directive. The Wind Farm Site lies within Zone D, which represents rural areas located away from large population centres.

The air quality in the vicinity of the Wind Farm Site and Grid Connection site is typical of that of rural areas in the southwest of Ireland, i.e., Zone D. Prevailing south-westerly winds carry clean, unpolluted air from the Atlantic Ocean onto the Irish mainland. The EPA publishes Air Monitoring Station Reports for monitoring locations in all four Air Quality Zones. The most recent report on air quality in Ireland, *'Air Quality in Ireland 2022'* was published by the EPA in September 2023. The EPA reports provide SO_2, PM_{10}, NO_2 and O_3 concentrations for areas in Zone D. These are detailed in Section 10.2.3 of Chapter 10 of this EIAR.

Due to the nature of the Proposed Development and the general character of the surrounding environment, air quality sampling was deemed to be unnecessary for this EIAR. Based on professional judgement it is considered that that air quality in the existing environment is reflective of the EPA Air Quality Zone D, since there are no major sources of air pollution (e.g., heavy industry) in the vicinity of the site.

The production of energy from wind turbines has no direct emissions as occurs from fossil fuel-based power stations. Harnessing more energy by means of renewable sources will reduce dependency on fossil fuels, thereby resulting in a reduction in harmful emissions that is damaging to human health and the environment. Some minor short term or temporary indirect emissions associated with the construction and decommissioning of the Proposed Development include vehicular and dust emissions.

A CEMP will be implemented throughout the construction phase (see Appendix 4-5 of this EIAR), which includes dust suppression measures. In addition, turbines and construction materials will be transported to the site on specified transport routes only. The agreed transport route roads adjacent to the Site will be regularly inspected for cleanliness and cleaned as necessary.

The Proposed Development, by providing an alternative to electricity derived from coal, oil or gas-fired power stations, will result in emission savings of carbon dioxide (CO_2), oxides of nitrogen (NO_x), and sulphur dioxide (SO_2). The production of renewable energy from the Proposed Development will have a Long-term, Significant, Positive effect on air quality.

Climate

This chapter identifies, describes and assesses the potential significant direct and indirect effects on climate arising from the construction, operation and decommissioning of the Proposed Development.

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.

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 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.

In June 2023, the EPA)released 'Ireland's Greenhouse Gas Emissions Projections 2022-2040'. The EPA has produced two scenarios in preparing these greenhouse gas emissions projections: a "With Existing Measures" (WEM) scenario and a "With Additional Measures" (WAM) scenario. These scenarios forecast Irelands greenhouse gas emissions in different ways. The WEM scenario forecasts Ireland emissions including all national policies and measures implemented by the end of 2021, the latest inventory year. The WAM scenario has a higher level of ambition and includes government policies and measures to reduce emissions, such as those in Ireland's Climate Action Plan 2024 (CAP 2024), that are not yet implemented. As implementation of policies and measures occurs, they will be migrated into the WEM Scenario.

The projections show that implemented policies and measures in the WEM scenario can deliver an 11% reduction in greenhouse gas emissions by 2030 compared to the 2018 level. The WAM scenario, including policies and measures from CAP 2024, is projected to deliver a 29% emissions reduction over the same period. This is well short of the legally binding commitment to achieving a 51% reduction in GHG emissions from 2021 to 2030, and to achieving net-zero emissions no later than 2050. Ireland's new 2030 target under the EU's Effort Sharing Regulation (ESR) is to limit its greenhouse gas emissions by at least 42% by 2030. This target was set in April 2023 upon amendment of the Emissions Sharing Regulation. For Ireland to achieve its national and international climate targets, it will require a full and rapid implementation of CAP 2024 measures and further measures to be implemented.

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 farm 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. The web-based version of the carbon calculator, which supersedes the excel based versions of the tool, was released in 2016 and is currently available as Version 1.8.1 which was last updated in 2023. The tool provides a transparent and easy to follow method for estimating the impacts of wind farms on the carbon dynamics of peatlands and was used to assess the effects of the proposed wind farm in terms of potential carbon losses and savings, taking into account removal of carbon sequestering vegetation, and operation of the Proposed Wind Farm. The model calculates the total carbon emissions associated with the proposed wind farm development including manufacturing of the turbine technology, transport, and construction of the development.

The full life cycle and embodied carbon of the proposed turbines have been taken account of in the Macauley Institute model. The emissions associated with the embodied carbon, along with the

construction phase transport movements of the remaining site infrastructure associated with the Proposed Development are considered using the Transport Infrastructure Ireland (TII) Carbon Tool (TII 2022)[2]. The TII Carbon Tool is customised for road and light rail projects in Ireland, using emission factors from recognised sources during the construction, maintenance, and operation of TII projects in Ireland.

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 impacts and loss of peat in the area of the development footprint. There may also be indirect impacts 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, locally, which permits the full decomposition of the stored organic material with the associated release of the stored carbon as CO_2. It is essential therefore that any wind farm development in a peatland area saves more CO_2 than is released. The Proposed Wind Farm is situated on agricultural land and peatland, covered by coniferous forestry and smaller areas of transitional woodland scrub. For this reason, the carbon balance between the use of renewable energy and the loss of carbon stored in the peat are assessed in Section 11.5.3.1 of the EIAR.

The Proposed Development will result in the loss of 160,051tCO_2e during the construction phase, the details of these carbon losses are provided in Table 11-6 of Chapter 11 of the EIAR. Please note, that in completion of these calculations a number of assumptions have been made under theoretical precautionary conditions; all assumptions are detailed in Appendix 11-1 Carbon Calculations. Therefore, it can be determined that the actual carbon losses associated with the Proposed Development will likely be less than the values provided in Table 11-6 of Chapter 11.

Using the maximum capacity output of 64.8MW, the **160,051** tonnes of CO_2 that will be lost to the atmosphere due to changes in soil and ground conditions and due to the construction and operation of the Proposed Development will be offset by the Proposed Development in approximately **33 months** of operation. Using the minimum capacity output of 51.3MW, the CO_2 that will be lost to the atmosphere during the construction phase will be offset by the Proposed Development in approximately 41 months of operation.

Following construction of the Proposed Development, there will be a Permanent Imperceptible Negative Effect on Climate as a result of greenhouse gas emissions from construction plant and vehicles, embodied carbon associated with the turbines and construction materials. Operation of the Proposed Development will have a Direct Long-Term Moderate Positive Effect on climate as a result of reduced greenhouse gas emissions. Operation of the Proposed Development will have a Direct Long-Term Moderate Positive Effect 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 Development, which comprises the proposed Wind Farm Site at Knockshanvo along with the proposed Grid Connection, both of which have been assessed within the EIAR.

The background noise environment has been established through noise monitoring surveys undertaken at seven noise sensitive locations (NSLs) surrounding the proposed Wind Farm Site. 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'

[2] *Transport Infrastructure Ireland Carbon Tool for Road and Light Rail Projects: User Guidance Document* https://www.tiipublications.ie/library/GE-ENV-01106-01.pdf

(IOA GPG). The results of the background noise survey have been used to derived appropriate noise criteria for the development in line with the guidance contained in 'Wind Energy Development Guidelines for Planning Authorities 2006'.

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

The assessment of construction and decommissioning noise and vibration and has been conducted in accordance with 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 and mitigation measures as recommended in the EIAR Chapter, it is not expected that there will be any significant noise and vibration impacts associated with the construction phase and the likely noise from construction activity at the nearest NSLs is expected to be within recommended threshold values. The associated construction noise and vibration impacts are not expected to cause any significant effects.

Based on detailed information on the site layout, the likely turbine noise emissions and turbine hub height for the Proposed Development, a series of turbine noise prediction models were prepared. The predicted turbine noise levels have been calculated in accordance with the IOA GPG recommendations. The assessment has confirmed that the residual cumulative turbine noise levels associated with the Proposed Development will be within the best practice noise criteria curves recommended in Irish guidance document 'Wind Energy Development Guidelines for Planning Authorities 2006'. Therefore, it is not considered that a significant effect is associated with the Proposed Development.

No significant vibration effects are associated with the operation of the Proposed Development.

In summary, the noise and vibration impact of the Proposed Development is not significant considering best practice guidance for wind turbine developments.

Archaeology and Cultural Heritage

Chapter 13 of the EIAR provides an assessment of the potential effects of the Proposed Development on the Cultural Heritage resource. Cultural Heritage includes archaeology, architectural heritage and any other tangible assets. The assessment was based on desktop research, field survey, GIS based mapping, ZTV, and was also assisted by representative photomontages and photowire images.

Where potential effects have been identified appropriate mitigation measures have been proposed in order to minimise any such effects. Proposed mitigation includes a 30m buffer zone around megalithic tomb CL044-068— prior to the commencement of construction works, pre-development archaeological testing of the Proposed Development infrastructure (turbine bases, hardstands, compounds, new roads, substation, grid connection route in off-road areas, etc) and archaeological monitoring during the construction stage of the project, including at specified locations along the proposed Grid Connection route.

Potential indirect effects on the setting of any UNESCO World Heritage Sites and those on a Tentative List within 20km, National Monuments within 10km, recorded monuments within 5km and RPS/NIAH structures within 5km were included in order to assess potential effects on setting in the wider landscape. The ZTV was utilised to assess the level of theoretical visibility of the proposed turbines from cultural heritage assets within the 5km and 10km study areas.

All cultural heritage assets within 100m of either side of the proposed Grid Connection route were assessed for potential effects to same. No direct effects to the recorded archaeological, architectural or

cultural heritage resource as a result of the proposed Grid Connection route have been identified. Mitigation measures are proposed where deemed appropriate and include archaeological monitoring of construction works along the proposed Grid Connection where the latter extends through the Zone of Notification for recorded monuments.

An assessment of potential cumulative effects was also undertaken taking into consideration other extant planning applications and existing and proposed wind farms within 25km. While some potential cumulative visual effects to the wider setting of cultural heritage assets is possible when considered with the existing, permitted and proposed wind farms, no significant cumulative impacts have been identified and no cumulative effects to the immediate setting of cultural heritage assets will occur.

An assessment of potential cumulative effects was also undertaken taking into consideration other extant planning applications and operational and proposed wind farms within 20km. While some potential cumulative visual effects to the wider setting of cultural heritage assets is possible when considered with the operational and proposed wind farms, no cumulative effects to the immediate setting of cultural heritage assets will occur.

Landscape and Visual

Chapter 14 of the EIAR is a Landscape and Visual Impact Assessment (LVIA) of the Proposed Development. The assessments in Chapter 14 focus on the impact of the proposed turbines as the essential aspect of the Proposed Development likely to give rise to significant landscape and visual effects. A study area was set to 20km from the proposed turbines termed as the 'LVIA Study Area'. The LVIA was conducted in accordance with national and international LVIA guidance through desktop analysis, on-site appraisals, topographical and ZTV modelling and production of photomontages. Chapter 14 includes a description of the landscape and visual baseline conditions of the Wind Farm Site and LVIA Study Area. The baseline exercises outline the local policy context with respect to landscape and visual designations, calculates the ZTV to identify the landscape areas and visual receptors needing assessment and evaluates the cumulative context of landscape and visual effects in combination with other existing, proposed and permitted wind farm developments in the LVIA Study Area.

Chapter 14 is accompanied by one volume and five appendices as follows:

- Volume 2: *Photomontage Booklet*, presenting existing and cumulative visualisations of the proposed Knockshanvo turbines from 16 No. representative viewpoints in the LVIA Study Area;
- Appendix 14-1: *LVIA Methodology*, outlining the detailed methodology and guidance used for the assessments reported in Chapter 14;
- Appendix 14-2: *LCA Assessment Tables*, assessing effects on designated Landscape Character Areas (LCAs);
- Appendix 14-3: *Photomontage Viewpoint Assessment Tables*, a visual impact assessment of the 16 No. representative viewpoints presented in the *Photomontage Booklet,* including assessment of cumulative effects;
- Appendix 14-4: *LVIA Baseline Map*, a large A0 map showing all baseline landscape features, visual receptors, ZTV and viewpoints;
- Appendix 14-5: *Photowire Booklet*, presenting draft photomontage visualisations from 28 No. viewpoint locations in the LVIA Study Area which were not selected for the final Photomontage Booklet

The Wind Farm Site is located in the Slieve Bernagh Uplands LCA of Co. Clare, which is situated on commercial forestry lands of 'Low' sensitivity which has been highly altered by human activity, with 8 of the 9 No. turbines sited within a 'Strategic Area' for wind development as designated by the county development plan and the remaining 1 No. turbine sited within an area designated as 'Acceptable in Principle'. The siting and design of the Proposed Development are found to comply with development

guidelines for wind energy in terms of its location on ridgelines and 4-times-tip-height set-back distance, spatial extent, spacing and layout of turbine clusters within undulating mountain topography, height and scale within the landscape and capacity to absorb cumulative wind energy developments.

Imagery was captured from a total of 44 No. viewpoints in the LVIA Study Area for the production of photomontages and photowire visualisations. These visualisations were used to assess the landscape and visual effects of the proposed turbines on all of the receptors scoped in for assessment during preliminary analysis using ZTV mapping. The visual receptors include: 7 No. designated Scenic Routes and Views, 1 No. OSi Viewing Area, 18 No. settlements, 7 No. recreational routes (i.e. walking trails), 2 No. cultural heritage destinations and 9 No. regional- and national-level transport routes. Many receptors are represented within the 16 No. selected photomontage viewpoints (Photomontage booklet), and many are represented by the 28 No. supplementary photowire viewpoints (Appendix 14-5).

Eight No. designated LCAs were identified within the LCA Study Area (area within 15km form the proposed turbines for assessment of effects on designated LCAs) and were scoped in for assessment following a preliminary analysis. The comprehensive assessment of each LCA is reported in Appendix 14-2. Six were assessed from Co. Clare and one each from Counties Tipperary and Limerick. Of these, 1 No. LCA was found to be of 'High' sensitivity: C LCA-13 'Ennis Drumlin Farmland' due to its proximity to the County Hub town of Ennis. The LCA in which the Proposed Development Site is located is C LCA-8 'Slieve Bernagh Uplands', which was found to have 'Low' sensitivity. For all LCAs, the effects were found to have a significance rating of 'Slight', owing to mitigating factors including: (i) increased distance from the Site (i.e. the turbines being viewed from relatively far away), (ii) design mitigation such as appropriate set-back distance from receptors and siting within the 'Strategic Area' landscape designation and (iii) localised screening by topography, vegetation and/or built structures.

Sixteen No. viewpoints were selected and comprehensively assessed for visual effects, of which 9 No. viewpoints were located within 5km of the Proposed Development Site. Of the viewpoints assessed, 14 No. had residual effects rating either 'Not Significant', 'Slight' or 'Moderate' according to the EPA (2022), and 2 No. viewpoints had residual effects rating as 'Significant'; these are discussed below.

The first viewpoint found to have 'Significant' residual visual effects was VP12 representing the 12 O'Clock Hills Waymarked Walking Trail (including the Looped Walks) in the townland of Snaty (Wilson) within the Wind Farm Site itself. This rating was primarily attributed to the position of turbines T1, T2 and T3 of the Western Cluster being situated in very close proximity to the Blue, Purple and Red Loops of the 12 O'Clock Hills walking route and the viewing area along the ridgetop of Knockanuarha. To offset effects upon the recreational amenity of this walking route, proposed works for one new section of walking trail and two new viewing areas, along with upgrades to a third viewing area, are incorporated as part of this EIAR. The new viewing areas are locations permitting long ranging and uninterrupted (by turbines) landscape views of a high scenic quality in multiple directions which are not significantly impacted by the Proposed Development or other wind energy projects (existing, permitted or proposed).

The second viewpoint found to have 'Significant' residual visual effects was VP13 representing views from the L3042 local road in the townland of Drumsillagh or Sallybank (Parker) approx. 800m west of the nearest proposed turbine. This rating was attributed to the existence of two residential receptors adjacent to the Wind Farm Site and viewpoint which are deemed to have a 'Substantial' magnitude of change; however, the horizontal extent of the affected views is not large and other factors such as adherence to set-back distance according to wind energy development guidance and the sense of scale of the development within the landscape are found to be appropriate.

The analysis of cumulative effects identified several possibilities of potential effects arising in different cumulative scenarios (existing, permitted and proposed) with 7 No. other existing, permitted and proposed wind energy developments identified within the LVIA Study Area. Assessment of cumulative effects are factored into the impact assessment of effects on specific receptors in Chapter 14. The greatest potential for cumulative effects arises with the proposed Oatfield Wind Farm (11 No. turbines), situated in very close proximity to the Proposed Development, in fact comprising two turbine clusters

situated north and south of the Site: 4 No. turbines sited immediately north of the Central Cluster at the foot of Knockshanvo mountain and 7 No. turbines immediately south of the Western Cluster on the flanks of Knockanuarna mountain. Assessment of cumulative visual effects of the proposed Knockshanvo turbines and Outfield turbines are comprehensively discussed in the viewpoint assessments in Appendix 14-3 and are summarised in Chapter 14.

Three No. developments, the permitted Carrownagowan (18 No. turbines), permitted Fahy Beg (8 No. turbines) and proposed Lackareagh (7 No. turbines – planning stage) and Wind Farms, are located to the east within the same Slieve Bernagh Uplands LCA of Co. Clare, constituting potential moderately distant views (within 5km) of turbines in combination with the Proposed Development when looking across Glenomra Valley from the elevated vantage point of the 12 O'Clock Hills. A fourth development, the proposed Ballycar (12 No. turbines) Wind Farm, is located on Woodcock Hill, to the south of the Wind Farm Site, and can be expected to constitute combined views of turbines, but only from the south. Two No. existing single-turbine wind farms, Vistakon and Knockballynameath, are located closer to Limerick City and rarely seen in combination with the Proposed Development.

The LVIA addresses all potential cumulative interactions through the use of photomontage visualisations and written descriptions. The LVIA emphasises that the probability of cumulative effects with other proposed developments is reliant upon the consenting process and a number of other post consent factors which will influence whether the project is constructed.

On balance, the Proposed Development is an appropriately designed development sited in a suitable landscape capable of effectively accommodating the Proposed Development.

Material Assets

This chapter of the EIAR addresses the likely significant effects of the Proposed Development on transportation infrastructure (Section 15.1 Traffic and Transport), on Other Material Assets (Sections 15.2.2.1 and 15.2.2.2), Telecommunications and Aviation (Sections 15.2.2.3 and 15.2.2.4). Waste Management is also considered within the EPA 2022 Guidelines as part of Material Assets (Section 15.2.2.5).

Traffic and Transport

Introduction

An assessment of the traffic effects on the local highway network was undertaken for the Proposed Development. The assessment considers the likely impacts on the transport delivery route to the site resulting from the additional traffic movements that will be generated by the Proposed Development during the construction, operational and decommissioning phases.

An assessment of the geometry of the delivery route was also undertaken in order to ensure that the abnormally sized vehicles required to deliver the turbine plant to the site are accommodated.

The Proposed Development will take 18-24 months to construct the proposed 9 turbine wind farm, the proposed grid connection route linking to the existing Ardnacrusha electrical 110kV substation, and associated development, during which all turbine components and all other associated materials will be transported to the site.

Traffic Route & Study Area

The Proposed Development is located in County Clare. The Turbine Delivery Route (TDR) route to the site for the abnormally sized loads transporting the large turbine components commences at Foynes Port in County Limerick.

From the access road serving Foynes Port the route turns left onto the N69 National Secondary Road at the existing priority junction. The route then heads east on the N69 for approximately 32kms. At a location on the northern side of N69 just to the east of the village of Kildimo, it is proposed that there will be a temporary transition zone constructed, where the turbine blades will be transferred from a standard method of transportation to vehicles with specialised adaptors that lift the blade in order to minimise the length of the transport vehicle. The TDR continues east on the N69 and then turns right at the N69 / R510 roundabout and onwards to the roundabout of the R510 and Father Russell Road. From this point the route turns left heading northeast passing through Limerick City Centre via the R526, O'Connell Avenue, O'Connell Street (contra-flow), Bridge Street and Athlunkard Street, to the roundabout of R463 Corbally Road / Pa Healy Road. The route then heads north on the R463 for approximately 4.3 kms crossing the River Shannon, which forms the County Limerick and County Clare border, onto the river crossing at Ardnacrusha . From here the route continues on the R465 for approximately 7.2 kms to the location of the proposed Wind Farm access junction on the R465 (Location 28).

The total length of the Turbine Delivery Route from Foynes Port to the access junction off the R465 is approximately 50 kms. All deliveries of abnormally sized loads will be made using Garda Siochana escorts and local transient traffic management measures put in place by the haulage company.

The construction and operational entrance for all traffic generated by the proposed Wind Farm, including the abnormally sized loads, will be via a proposed access junction off the R465. The proposed junction takes the form of a priority type junction with the R465 forming the priority route. The junction is designed in accordance with guidelines with visibility splays provided for the 80 km/h speed limit.

A crossroads type junction is proposed on the L-3042 at Sallybank to serve as a crossing point for construction traffic accessing turbines 1 to 7. As the junction will take the form of a crossroads, traffic management measures will be implemented during both the construction, decommissioning and operational stages of the Proposed Development.

Access junctions are also proposed at 2 locations on the local road network at points where the Wind Farm access road crosses the L-30144-0 and L-30426-23.

All deliveries made by abnormally sized loads to the site will be accompanied by an escort provided by An Garda Siochana and the haulage company.

The 110kV on-site electrical substation will be connected by means of an underground 110kV electrical cable to the existing 110kV Ardnacrusha electrical substation. The proposed underground electrical cabling route is approximately 9.2 km in length and is located predominately within the public road corridor.

Vehicle types and network geometry

The types of vehicles that will be required to negotiate the local network will be up to 87.3 metres long and will carry a blade 81.5 metres in length. From the location of the proposed transition zone located at Kildimo west of Limerick City, to the wind farm access junction off the R465, the blades will be attached to adaptors and lifted, which will reduce the vehicles length to 58.4 metres

An assessment of the geometric requirements of the delivery vehicles was undertaken on the delivery route. 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 identified. 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

During the 9 days when the concrete foundations are poured the effect on the surrounding road network will be negative, resulting in an increase in traffic volumes ranging from 3.0% on the R463 Athlunkard Street to +2.3% on the Corbally Road. As the route travels north on the R465 and background traffic flows reduce significantly , the percentage increase becomes more pronounced, with +24.0% forecast on the R465 between Carmody's Cross and the site access. In the event that the concrete is delivered from the north, it is forecast that there will be a 29.5% increase on the R466, or +13.0% if delivered from the R465 just north of Broadford. Between Broadford and the site access it is forecast that there will be a 21.7% increase in traffic volumes. The effect on all these roads will be negative, temporary and will be slight.

During the remaining 350 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 +1.0% on the R463 Athlunkard Street and +0.8% on the Corbally Road. As the route travels north on the R465, the percentage increase is forecast to be +8.4% on the R465 between Carmody's Cross and the site access. In the event that all materials for this stage are delivered from the north, it is forecast that there will be a 10.3% increase on the R466, or +4.6 if delivered from the R465 just north of Broadford. Between Broadford and the site access it is forecast that there will be a 7.6% increase in traffic volume on these days. On these days, the direct effect will be temporary and will be slight.

For the 85 days that will occur consecutively to the site preparation and ground works but on a different part of the road network materials will be delivered from a quarry close to Foynes to the proposed transition zone on the N69 to the east of Kildimo. On these days effect on this section of the N69 will be negative, temporary and will be slight.

During the 15 days when the various component parts of the wind turbine plant are delivered to the site using extended articulated HGVs, the increase in traffic volumes will range from +1.9% on the N69 east of Foynes, to +1.0% on the R463 Athlunkard Street and +0.8% on the Corbally Road. As the route travels north on the R465, the percentage increase is forecast to be +8.1 on the R465 between Carmody's Cross and the site access. The provision of traffic management measures, including ensuring that these deliveries are made at night, will be required to minimise the impact of development traffic on the study network on these days.

For 9 days on the delivery route 64 additional PCUs (made up of cars and standard articulated HGV movements to the site and back) will travel on the study network. On these days, the percentage increase on the study network will range from +0.8% on the N69 east of Foynes to +0.4% on the R463 Athlunkard Street and +0.3% on the Corbally Road. As the route travels north on the R465, the percentage increase is forecast to be +3.6 on the R465 between Carmody's Cross and the site access. The direct effect during this period will be temporary and will be slight.

It is noted that the proposed access junction on the R465 and the existing R465 / R466 junction located in Broadford are forecast to operate well within capacity during the construction period.

During the construction of the Grid Connection there will be closures along the route for a total of 70 days. As traffic volumes are very low, the direct effect will be negative, temporary and slight.

Once the Proposed Development is operational the traffic impact created by maintenance staff will be imperceptible.

Telecommunications and Aviation and Other Material Assets

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, effecting, for example

radio signals. The most significant potential effect occurs where the renewable energy development is directly in line with the transmitter radio path.

During the development of any large project that holds the potential to affect telecoms or aviation, the Developer is responsible for engaging with all relevant Telecoms Operators and the relevant Aviation Authorities to ensure that the proposal will not interfere with television or radio signals by acting as a physical barrier. In the event of any potential impact, the Developer for each individual project is responsible for ensuring that the necessary mitigatory measures are in place.

A total of 3 no. telecommunications links and 2 no. broadcast transmission links are within the vicinity of the Site. The Applicant commissioned Ai Bridges to carry out a Telecommunications Impact Assessment (TIA) to evaluate the possible impacts of the proposed Wind Farm on existing telecommunications operator networks. The findings of TIA concluded that the Wind Farm will not impact any of the telecom operator radio networks in the area.

The nearest airport to the Proposed Development site is Shannon Airport, County Clare, located approximately 13 kilometres southwest of the Proposed Development. A scoping response was received from the Department of Defence (DoD) and the Irish Aviation Authority (IAA).

The scoping response of the DoD has requested that standard lighting requirements be used at the Proposed Development site. These requirements will be complied with for the Proposed Development and any further details will be agreed in advance of construction with the DoD. The coordinates and elevations for built turbines will be supplied to the IAA, as is standard practice for wind farm developments.

Due to the Wind Farm Site's proximity to Shannon Airport, and in consideration of the IAA's scoping response, an Aviation Impact Assessment (AIA) has been undertaken by Ai Bridges and Cyrrus Ltd. The findings of the AIA concludes that with the assessment outcomes and mitigation measures, the residual effects of the Proposed Development on aviation are not significant.

The Proposed Development has been designed to avoid existing underground electricity cables and the appropriate separation distances in accordance with ESB requirements have been maintained.

Vulnerability of the Project to Major Accidents and Natural Disasters

Chapter 16 of the EIAR describes the likely significant adverse effects on the environment arising from the vulnerability of the Proposed Development as detailed in Chapter 4 to risks of major accidents and/or natural disasters, as well as the potential of the Proposed Development itself to cause potential major accidents and/or natural disasters.

Major accidents or natural disasters are hazards which have the potential to affect the Proposed Development and consequently have potential impacts on the environment. These include accidents during construction, operation and decommissioning caused by operational failure and/or natural hazards. The assessment of the risk of major accidents and/or disaster considers all factors defined in the EIA Directive that have been considered in this EIAR, i.e., population and human health, biodiversity, ornithology, land, soils & geology, water, air quality, climate, material assets, cultural heritage and the landscape.

A desk-study has been completed to establish the baseline environment for which the proposed risk assessment is being carried out. This will influence both the likelihood and the impact of a major accident or natural disaster. Local and regional context has been established prior to undertaking the risk assessment to develop an understanding of the vulnerability and resilience of the area to emergency situations.

Further detail on the baseline environment is provided in Section 16.3 of Chapter 16 of this EIAR.

A wind farm is not a recognised source of pollution. It is not subject to Industrial Emissions Directive regulation or any other EPA environmental regulatory consent. Should a major accident or natural disaster occur the potential sources of pollution onsite during the construction, operational and decommissioning phases are limited and of low environmental risk. Sources of pollution with the potential to cause significant environmental pollution and associated negative effects such as bulk storage of hydrocarbons or chemicals, storage of wastes, management of flammable materials etc. are limited and so there is an inherent low level of environmental risk associated with major accident or natural disaster impacting the Proposed Development and causing environmental damage.

As outlined in Section 16.4.1.5, the scenario with the highest risk score in terms of the occurrence of major accident and/or disaster was identified as, 'Contamination' during the construction, operation and decommissioning phases and risk of 'Fire/ Explosion' during the construction, operation and decommissioning phases.

The Proposed Development has been designed and built in accordance with the best practice measures set out in this EIAR and, as such, mitigation against the risk of major accidents and/or disasters is embedded through the design.

The risk of a major accident and/or disaster during the construction of the Proposed Development is considered 'low' in accordance with the '*Guide to Risk Assessment in Major Emergency Management*' (DoEHLG, 2010).

It is considered that when the mitigation and monitoring measures outlined in the CEMP are implemented and adhered to there will not be significant residual effect(s) associated with the construction, operation and decommissioning of the Proposed Development.

Interactions of the Foregoing

The preceding Chapters 5 to 16 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, Hydrology and Hydrogeology, Air, Climate, Noise and Vibration, Landscape and Visual, Cultural Heritage (Archaeological, Architectural and Cultural Heritage), Material Assets (Roads and Traffic, Telecommunications and Aviation) and Vulnerability to/from Major Accidents and Natural Disasters, as a result of the Proposed Development as described in Chapter 4 of this EIAR. All of the potential significant effects of the Proposed Development and the measures proposed to mitigate them have been outlined in the preceding chapters of this EIAR. Mitigation measures and best practice measures for the construction, operation and decommissioning of the Proposed Development are detailed in the accompanying Construction and Environmental Management Plan (CEMP). 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 17 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 5–16) of the EIAR.