Planning and Environmental Consultants

Environmental Impact Assessment Report (EIAR)

Lackareagh Wind Farm, Co. Clare

Non-Technical Summary

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1. NON-TECHNICAL SUMMARY

1.1 Introduction

This Environmental Impact Assessment Report (EIAR) has been prepared by MKO on behalf of the applicant EDF Renewables Ireland Ltd., hereafter referred to as EDF, who intend to apply to Clare County Council (CCC) for planning permission to construct a renewable energy project which will comprise 7 no. wind turbines and associated infrastructure, in the townlands of Kilbane, Killeagy (Ryan), Killeagy (Stritch), Killeagy (Goonan), Magherareagh, Shannaknock, Ballymoloney and Lackareagh Beg, Co. Clare, and a 38kV onsite substation, battery energy storage system and associated works. The EIAR also assesses the proposed underground grid connection cabling route to Ardnacrusha 110kV substation, located in the townlands of Ballykeelaun and Castlebank Co. Clare.

For the purposes of this EIAR:

- Where the 'Proposed Project' is referred to this encompasses the entirety of the project for the purposes of this EIA in accordance with the EIA Directive. The Proposed Project is described in detail in Chapter 4 of this EIAR.
- Where 'proposed development' is referred to, this encompasses everything within the red line boundary, i.e., the wind farm infrastructure, substation and BESS compound.
- Where the 'Proposed Wind Farm' is referred to, this refers to turbines and associated foundations and hardstanding areas, including access roads, underground cabling, permanent meteorological mast, temporary construction compounds, carriageway strengthening works, junction accommodation works, peat and spoil management, tree felling, site drainage, operational stage signage, battery energy storage system, 38kV onsite substation, and all ancillary works and apparatus. The Proposed Wind Farm is described in detail in Chapter 4 of this EIAR.
- Where the 'Proposed Grid Connection Route' is referred to, this refers to underground 38kV cabling connecting to the existing Ardnacrusha 110kV substation, and all ancillary works and apparatus. The Proposed Grid Connection Route is described in detail in Chapter 4 of this EIAR.
- Where 'the site' is referred to, this relates to the primary study area for the EIAR, as delineated by the EIAR Site Boundary in green as shown on Figure 1-1.

This EIAR, along with a Natura Impact Statement (NIS), will accompany the application for planning permission for the proposed development which will be made to Clare County Council. Both the EIAR and NIS contain the information necessary for the local authority to complete the Appropriate Assessment and Environmental Impact Assessment as required for this application for planning permission. Both the EIAR and NIS take into account the combined impacts of these individual elements of the Proposed Project.

The EIAR complies with the EIA Directive of 2011/92/EU. The Environmental Impact Assessment (EIA) of the proposed development will be undertaken by Clare County Council as the competent authority.

Applicant

The applicant for the Proposed Project, EDF Renewables Ireland, is part of one of the world's largest electricity companies and their investment and innovation in renewable energy projects is reducing costs for consumers, bringing significant benefits to communities.

EDF Renewables Ireland's team has a wealth of experience in bringing complex development projects to fruition, across onshore and offshore wind, solar PV and battery storage technology, and is supported by more than 400 colleagues in the UK.

In 2020, EDF acquired 50% of Codling Wind Park, a major offshore wind farm which is proposed to be located off the coast of Wicklow and have also entered into a 50:50 partnership to develop the Emerald and Western Star floating offshore wind farms, to be located off the coasts of Cork and Clare, respectively. Together these three projects will power over 2 million homes in Ireland.

Earlier this year, EDF energised three of Ireland's first grid-scale solar farms and have announced plans for 5 onshore wind farms across Ireland. In total, EDF will have an Irish onshore development pipeline of almost 1GW.

In the UK, EDF Renewables has an operating portfolio of 36 wind farms and two battery storage units (together totalling more than 1.5GW) and a development pipeline of 14GW across wind, solar and battery storage. EDF renewables operates in more than 20 countries around the world.

Brief Description of the Proposed Project

The Proposed Project will comprise the construction of 7 no. turbines with a blade tip height range of between 179.5 and 180 metres and all associated works, and a 38kV substation and associated works, including underground 38kV cabling to connect to the national grid at the existing 110kV Ardnacrusha substation. The full description of the proposed development is detailed in Chapter 4: Description of this EIAR.

The development will consist of:

i. *The construction of 7 no. wind turbines with the following parameters:*
    a. *Total tip height range of 179.5m – 180m,*
    b. *Rotor diameter range of 149m – 155m,*
    c. *Hub height range of 102.5m to 105m,*
ii. *Construction of associated foundations, hardstand and assembly areas;*
iii. *All associated wind farm underground electrical and communications cabling connecting the turbines and mast to the proposed electrical substation;*
iv. *Construction of 1 no. permanent 38kV electrical substation including a single-story control building with welfare facilities, all associated electrical plant and equipment, security fencing, entrance on to new access road, all associated internal underground cabling, drainage infrastructure, wastewater holding tank, retention separator tank, and all ancillary works, in the townland of Killeagy (Goonan), Co. Clare;*
v. *A Battery Energy Storage System within the 38kV electrical substation compound;*
vi. *1 no. permanent meteorological mast of c. 36.5m in height, associated foundation and hard-standing area in the townland of Shannaknock;*
vii. *The permanent upgrade of 1 no. existing site entrance off the L7080 ('The Gap Road') for the provision of construction and operational access;*
viii. *Provision of 3 no. new permanent site entrances off the L7080 for the provision of construction and operational access;*
ix. *Provision of 3 no. new temporary site entrances off the L7080 for the provision of construction access;*
x. *Upgrade of existing tracks/roads, including the L7080, and the provision of new site access roads, 4 no. watercourse crossings, junctions and hardstand areas;*
xi. *1 no. temporary construction compound with temporary offices and staff facilities in the townland of Killeagy (Goonan);*
xii. *1 no. temporary storage area in the townland of Killeagy (Goonan);*
xiii. *1 no. borrow pit in the townland of Killeagy (Goonan);*
xiv. *Peat and Spoil Management;*
xv. *Tree Felling to accommodate the construction and operation of the proposed development;*
xvi. *Operational stage site and amenity signage; and*
xvii. *All ancillary apparatus and site development works above and below ground, including soft and hard landscaping and drainage infrastructure*

The applicant is seeking a ten-year planning permission for development.

In the interest of clarity, the Proposed Project is a combination of the Proposed Wind Farm, the TDR and the Proposed Grid Connection Route. This EIAR, along with a Natura Impact Statement ('NIS'), will accompany the application for planning permission for the Proposed Project which will be made to the local authority. Both the EIAR and NIS contain the information necessary for the local authority to complete the Appropriate Assessment and Environmental Impact Assessment (EIA) of the Proposed Project as required for the planning permission application.

The entirety of the Proposed Wind Farm will be the subject of a planning application to CCC. However, all elements of the Proposed Project as described above will be assessed cumulatively and in combination with other plans and projects to aid the local authorities in carrying out an EIA.

Both the EIAR and NIS take into account the combined impacts of these individual elements of the Proposed Project.

The EIAR Site Boundary identifies the primary EIAR site area for the Proposed Project, however, each individual topic, i.e., chapter, has its own study area for assessment purposes relevant to that topic which will be clearly identified in the relevant chapters. The actual site outline (red line planning application boundary, i.e., the proposed development) for the purposes of this planning permission application occupies a smaller area within the primary EIAR Site Boundary. The EIAR Site Boundary encompasses an area of approximately 292 hectares. The permanent footprint of the Proposed Project measures approximately 8.4 hectares, which represents approximately 2.9% of the site.

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

Modern onshore wind turbine generators currently have a typical generating capacity in the 4 to 7 MW range, with the generating capacity continuing to evolve upwards as technology improvements are achieved by the turbine manufacturers. For the purposes of this EIAR it is assumed that the wind turbine model installed as part of the Proposed Project will have an output of 6.6MW. Therefore, on this basis, the proposed 7 no. wind turbines would have a combined generating capacity of 46.2MW. The actual turbine procured as part of a competitive tender process may have a power output that is marginally lower or greater than the 6.6MW turbine described in the EIAR.

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 Project provides the opportunity to capture an additional part of County Clare's valuable renewable energy resource. If the Proposed Project were not to proceed, the existing uses of commercial forestry and agriculture would continue. The opportunity to harness the wind energy resource of County Clare would be lost, as would the opportunity to contribute to meeting Government and EU targets for the production and consumption of electricity from renewable resources and the reduction of greenhouse gas emissions. The opportunity to generate local employment and investment would also be lost.

Economic Benefits

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

Commercial rate payments from the Proposed Project will be provided to Clare County Council 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 Project has the potential to create 80-100 jobs during the construction phase and 2-3 jobs during operational and maintenance phases of the Proposed Project. During construction, additional indirect employment will be created in the region through the supply of services and materials to the renewable energy development. There will also be income generated by local employment from the purchase of local services i.e. travel, goods and lodgings. Further details on employment associated with the Proposed Project are presented in Section 5.10.22 of this EIAR.

Should the Proposed Project receive planning permission, there are substantial opportunities available for the local area in the form of Community Benefit Funds. The value of this fund will be directly proportional to the energy produced at the site and will support and facilitate projects and initiatives in the area including youth, sport and community facilities, schools, educational and training initiatives, and wider amenity, heritage, and environmental projects.

Purpose and Structure of this EIAR

The purpose of this EIAR is to document the current state of the environment on and in the vicinity of the site and to quantify the likely significant effects of the Proposed Project 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 Project.

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. *Birds*
8. *Land, Soils and Geology*
9. *Water*
10. *Air Quality*
11. *Climate*
12. *Noise and Vibration*
13. *Landscape and Visual*
14. *Cultural Heritage*
15. *Material Assets (including Traffic and Transport, Telecommunications and Aviation)*
16. *Major Accidents and Natural Disasters*
17. *Interactions of the Foregoing*
18. *Schedule of Mitigation Measures*

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

Assessment of Turbine Parameter Range within the EIAR

As detailed above, and further detailed in Chapter 4 of this EIAR, the Proposed Project will comprise the construction of 7 No. wind turbines and associated hardstand areas with the following parameters:

a) *Total tip height range of 179.5m – 180m,*

b) *Rotor diameter range of 149m – 155m,*
c) *Hub height range of 102.5m to 105m*

For the purposes of this EIAR, various types and sizes of wind turbines, within the proposed ranges outlined above, have been selected and considered in the relevant sections of the EIAR. This allows for a robust assessment of the proposed range of turbines. Turbine design parameters have a bearing on the assessment of shadow flicker, noise, visual impact, traffic and transport and ecology (specifically birds), and Table 1-4 in Chapter 1 details the specific sections within the EIAR where turbine scenarios within the turbine parameter range are assessed.

It should also be noted that the assessment of the development footprint of the Proposed Project site, within this EIAR, is based on the maximum potential footprint for all of the infrastructural elements. This precautionary approach is taken as the assessment of the maximum development footprint will, in the absence of mitigation measures, give rise to the greatest potential for significant effects. Should the development footprint be less than the maximum, the potential for significant effects will also be reduced.

1.2 Background of the Proposed Project

This section of the EIAR sets out the energy and climate change related policy and targets along with the strategic, regional, and local planning policies relevant to the Proposed Project. It also summarises EIA scoping undertaken, and 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 Project to assist Ireland in meeting its national targets and European commitments in relation to climate change and decarbonisation.

The Proposed Project comprises the provision of 7 no. wind turbines with an estimated installed generating capacity of c. 46 MW and associated infrastructure. The Proposed Wind Farm will connect to the national grid via a 38kV underground grid connection cable from a proposed 38kV onsite substation to the existing 110kV Ardnacrusha substation, Co. Clare. The Proposed Grid Connection Route will be subject to a separate future planning application. It is assessed in this EIAR as it forms part of the overall Proposed Project.

The need to decarbonise the economy and reduce emissions has always been imperative, however in recent years the urgency involved has become clearer to all stakeholders. The latest Climate Action Plan 2024 (CAP) published by the Irish Government sets out the detail for taking action to deliver the decarbonisation required under the carbon budgets and sectorial emissions ceilings. Central to this is the set of measures set out to increase the proportion of renewable electricity to up to 80% by 2030 and a target of 9GW from onshore wind. The CAP places front and centre the facts that without urgent action, global warming is likely to be more than 2°C above pre-industrial levels, threatening the health and livelihoods of people across the globe. Urgency of action is also a key focus of the CAP. All sectors will have to further their efforts if the core and further measures are to be achieved.

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 Project is consistent with the policies and objectives of the Clare County Development Plan 2023-2029.

Clare County Development Plan 2023 – 2029

The Clare County Development Plan 2023-2029 ("CDP") was adopted in March 2023 and sets out Clare County Council's policies and objectives for the proper planning and sustainable development of the County. The CDP provides the framework within which the decision on the planning application for the Proposed Wind Farm is made.

Addressing climate change is a key underlying goal of Clare County Council. Goal II of the CDP is to become '*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.'*

Objective CDP6.17 (iii) directly supports the development of renewable energy production, which is as follows:

'Supporting on-land and off-shore renewable energy production by a range of appropriate technologies in line with CDP Objective 3.3'

The CDP recognises the importance of aligning with national renewable energy policy by facilitating renewable energy developments subject to the relevant assessments and requirements. Objective CDP8.12 Renewable Energy states the following:

'To support the implementation of the National Renewable Energy Action Plan (NREAP), the Clare Wind Energy Strategy and the Clare Renewable Energy Strategy to facilitate the development of renewable energy developments in rural areas to meet national objectives towards achieving a low carbon economy by 2050 subject to the requirement of the RES SEA Environmental Report and the mitigation measures arising from the CDP Appropriate Assessment as contained in Volume 10(a).'

The CDP also recognises the importance of strengthening the grid network in the county. The CDP includes the following objective in relation the electricity networks, of particular relevance to the project are objective CDP11.45 (b) & (e):

b) To facilitate future alternative renewable energy developments and associated utility infrastructure throughout the County; .....
e) To collaborate with EirGrid over the lifetime of the plan to ensure that the County's minimum target of 1,167MW of renewable energy generation is achieved and can be accommodated on the electricity network in County Clare; and ...

The Proposed Wind Farm is located in a Settled Landscape, the Plan notes that Settled landscapes accommodate roads, power-lines, quarries and piped services that service settlements and industry. Uses which area envisaged in Settled Landscapes includes energy development.

Clare Renewable Energy Strategy

The County Clare Renewable Energy Strategy (RES) was adopted as Volume 5 of the CDP 2023 – 2029. The RES includes the following vision:

"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."

The RES sets out a sustainable balance of renewable energy resources up to 2030 which ensures that there is no over reliance or over concentration on any single technology. With regard to onshore wind energy, a target of ***550MW***, as identified in the WES, is included. It should be noted, however, that this target is not a 'cap' and will not limit the potential for greater generation of renewable energy if exceeded, as stated in objective RES 3.1 below:

- **Objective RES 3.1** (Renewable Energy Targets): To facilitate the achievement of (or to exceed where possible) the renewable energy targets set out in Table 3.2 by 2030, ensuring that County

Clare is the national leader in sustainable renewable energy generation, supporting energy efficiency, security and conservation, achieving balanced social, environmental and economic development throughout the County and assisting in the achievement of Ireland's Green Energy target.

Clare Wind Energy Strategy

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 strategy remains unchanged since the WES was originally prepared as part of the 2011 – 2017 Development Plan and due to a government circular PL20-13. The WES includes wind energy planning policy and objectives to guide wind energy development in County Clare.

Lands classified under the WES have been developed for wind farm developments based on specific objectives. The Proposed Wind Farm site is located in an area classified as 'Open to Consideration', which is outlined below:

WES 10: 'Open to Consideration'

Wind energy applications in these areas will be evaluated on a case-by-case basis subject to:

- *Viable wind speeds;*
- *environmental resources and constraints;*
- *and cumulative impacts.*

The Proposed Wind Farm site, in its entirety, is located in an area designated as open to consideration. As such, the proposed Lackareagh Wind Farm will be assessed on a case-by-case basis subject to viable wind speeds, environmental resources and constraints and cumulative impacts.

The WES also provides advice on the landscape capacity to accommodate wind farm developments based on Landscape Character Areas (LCA's). The Proposed Wind Farm is located in the Sliabh Bernagh LCA. The LCA is considered to have a medium to low sensitivity to wind farms. The appropriate wind farm size for this area is deemed to be large. Siting of multiple wind farms in the Sliabh Bernagh LCA is considered *'acceptable, depending on topography as well as siting and design of wind energy developments involved'*.

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 this EIAR.

The aim of these guidelines is to assist with the proper planning of wind energy 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. Furthermore, 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 tie of lodgement, and decision makers (An Bord Pleanála and Local Authorities) are required to have regard to them, they are not bound to apply their provisions and they can (and do), where there is sufficient justification, consider updated standards/requirements/specifications in assessing impacts and the proper planning and sustainable development of the area.

The Proposed Wind Farm adheres to the Guidelines in its design and preparation. In this regard this EIAR considers all relevant potential environmental impacts that could arise (Chapter 5 of the Guidelines), and the design of the Proposed Wind Farm has followed the design principles established in Chapter 6 of the Guidelines.

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 regard to the Draft (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 Clare County Council's online planning portal in August 2024 for relevant planning applications within the red line planning application site boundary. 1 no. of extant permissions was identified in County Clare. This application relates to a proposed meteorological mast on the wind farm site and is currently under appeal with An Bord Pleanála. The planning search also found 8 no. wind energy applications within 25km of the site. Planning applications in the wider area primarily consist of residential and agricultural applications.

Scoping and Consultation

Section 2.7 presents detail of the EIA Scoping undertaken with regards the Proposed Project. A scoping report, providing details of the Proposed Project, was prepared by MKO, and circulated in December 2022. MKO requested the comments of the relevant personnel/bodies in their respective capacities as consultees with regards to the EIAR process. As part of the constraints mapping process, which is detailed in Chapter 3 of this EIAR, telecommunications operators were contacted in May 2022 in order to determine the presence of telecommunications links either transversing the site or in close proximity to the Proposed Wind Farm Site. Chapter 2 includes a list of scoping consultees and responses received, with full copies of all scoping responses received set out in Appendix 2-1 of the EIAR.

Community engagement has been undertaken by the Applicant, details of which can be found in Appendix 2-2 of this EIAR. In summary, the report was prepared to record the consultation carried out with the local community in respect of the Proposed Project. The applicant has carried out consultation in relation to the Proposed Project with local residents and interested parties in the wider community. The objective of the consultations was to ensure that the views and concerns of all were considered as part of the Proposed Project design and EIA process.

The Proposed Project has the potential to have significant benefits for the local economy, by means of job creation, landowner payments and commercial rate payments. An important part of any renewable energy development, which EDF Renewables Ireland Ltd. has been at the forefront of developing, is its Community Benefit Package as discussed in detail in Appendix 2-2.

Section 2.7 of this EIAR also includes details of the pre-planning meetings undertaken prior to the planning application being lodged, including engagement with Clare County Council under the provisions of Section 247 and 34(H) of the Planning and Development Act 2000, as amended.

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, 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 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 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 area 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 the different disciplines in their cumulative impact assessment are included in Appendix 2-3 of the EIAR.

1.3 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 Project 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 Project not be implemented, has also been considered.

Alternative Locations

The process of identifying a suitable wind farm site is influenced by several factors. While wind speeds, the area of suitable or available land, proximity to a grid connection point and planning policy are all very important, a wind farm project must be commercially viable/competitive, as otherwise it will never attract the necessary project finance required to see it built.

Sites selected for the development of a wind farm must be suitable for consideration under a number of criteria, such as:

- **Grid Connection**: Proximity to the national grid node;
- **Wind Speed:** Average annual wind speeds conducive to wind energy development;
- **Designated Sites:** Located outside of EU Natura 2000 sites; locations outside of National designations; located outside of Article 17 and Annex I Habitats;
- **Sensitive Properties**: Capable of complying with required setbacks from sensitive properties.

- **Residential Density:** Sufficient area of unconstrained land that could potentially accommodate a wind farm development and turbine spacing requirements.
- **Landscape:** Appropriate landscape setting for a wind energy development
- **Planning Policy:** Compliance with County Development Plan Renewable Energy Strategy for wind energy development;

From the review of the criteria set out above, the Proposed Project site was identified as a suitable location for the provision of a renewable energy development of the scale proposed. The Proposed Project site is located on agricultural land and existing commercial forestry which allows the site to take advantage of existing access roads (which will be upgraded) and highlights the suitability of the site as it can make sustainable use of these established items of infrastructure.

Taking account of these favourable characteristics, the Proposed Wind Farm site is located within an area designated as 'Open to Consideration' in the draft Clare County Project Plan 2023 – 2029. Wind energy developments proposed within this area will be judged on a 'case by case basis' on whether they are suitable for the area. The area that the Proposed Project is located within has favourable environmental characteristics. A robust assessment of wind energy constraints in Co. Clare has indicated that the Proposed Wind Farm site has development potential and can contribute towards the wind energy targets, as set out in international, national and local policy. This report includes an assessment of the relevant international, national, regional and local planning and renewable energy policy that applies to the Proposed Project (Chapter 2) which highlights the differences between local policy and international/national/regional policy.

From the review of the criteria set out above, the Proposed Grid Connection Route was identified as a suitable location for the provision of a connection of the Proposed Wind Farm to the National Grid.

Alternative Renewable Energy Technologies

During the initial stages of the Proposed Project design, the possibility of constructing a solar PV array at the site was investigated. To achieve the same electricity output from solar energy as is expected from the Proposed Project site (c. 46.2MW), a larger development footprint would be required. As detailed in Section 1.1.1 in Chapter 1, the EIAR site boundary encompasses an area of approximately 291 hectares and the permanent footprint of the Proposed Project measures approximately 8.9 hectares, which represents approximately 2.9% of the site. In order to achieve a c. 46.2MW output using solar PV arrays, there would be a requirement of approximately 73.9ha, which represents approximately 25.3% of the site

Alternative Turbine Numbers and Model

The proposed wind turbines will have a potential power output of 6.6 megawatts (MW). It is proposed to install 7 turbines at the Proposed Wind Farm which could achieve approximately 46.2 MW output under the maximum scenario of turbine parameters that were assessed within the EIAR; please refer to Table 1-3 in Chapter 1 of this EIAR for details on the three scenarios that were utilised for assessment within this EIAR. Such a renewable energy output could also be achieved on the Proposed Wind Farm site by using smaller turbines (for example 2.5 MW machines). However, this would necessitate the installation of over 18 turbines to achieve a similar output. Furthermore, the use of smaller turbines would not make efficient use of the wind resource available having regard to the nature of the Proposed Wind Farm site. A larger number of smaller turbines would result in the wind farm occupying a greater footprint within the site, with a larger amount of supporting infrastructure being required (i.e., roads etc) and increasing the potential for environmental impacts to occur.

Alternative Turbine Layout and Development Design

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

Following the mapping of all known constraints, detailed site investigations were carried out by the project team. The ecological assessment of the Proposed Project site encompassed habitat mapping and extensive surveying of birds and other fauna. This assessment, as described in Chapter 6 Biodiversity of this EIAR, optimised the decision on the siting of turbines and the carrying out of any development works, such as the construction of roads. The hydrological assessment of the Proposed Project site encompassed site specific flood modelling for 100-yr and 1000-yr events. This assessment, as described in Chapter 9 Water of this EIAR, optimised the decision on the siting of turbines, roads and the onsite substation. Where specific areas were deemed as being unsuitable for the siting of turbines or roads, etc., alternative locations were proposed and assessed, taking into account the areas that were already ruled out of consideration. The final Proposed Project layout takes account of the results of all site investigations and baseline assessments that have been carried out during the EIAR process. The final chosen layout is considered the optimal layout given it has the least potential for environmental effects.

Alternative Design of Ancillary Structures

The ancillary structures required for the Proposed Project include construction compound and temporary set down area, proposed borrow pit and underground electrical cabling.

The temporary construction compound and temporary set down area will be used for the storage of all construction materials, turbine components, staff facilities and car-parking areas for staff and visitors. The use of a temporary construction compound and separate temporary set down area was deemed preferable to the alternative of a single large compound. Principally, it will result in shorter distances for traffic movements within the site during construction. The introduction of the temporary set down area also negates the need for blade fingers on all turbine hardstands, thus minimising the cut and fill footprint.

In order to facilitate the construction of the Proposed Project, the majority of the crushed stone and hardcore materials that will be required for the construction phase will be sourced from within the Proposed Wind Farm site through a combination of the onsite borrow pit and the cut and fill exercise which will be carried out to facilitate the construction of the onsite infrastructure. This was deemed the more environmentally prudent approach over importing all stone and hardcore materials into the site from a nearby quarry location due to the volume of material to be generated during the construction phase, and the availability of suitable material on the site. The borrow pit is strategically located near the centre of the Proposed Wind Farm site and is served by existing access roads. As a result, vehicle emissions and the potential for dust arising will be reduced.

It should be noted also that in order to facilitate the construction of the Proposed Project, deliveries of ready-mix concrete and dressing material for onsite access roads will need to be sourced and imported from nearby quarry locations. Further details on the traffic movement associated with these deliveries can be found in Chapter 15 Section 15.1.

Alternative Grid Connection Cabling Route Options

A key consideration in determining the grid connection method for a proposed wind energy development is whether the cabling is undergrounded or run as an overhead line. While overhead lines are less expensive and allow for easier repairs when required, underground lines will have no visual impact. For this reason, it was considered that underground lines would be a preferable alternative to overhead lines. The Wind Energy Guidelines (DoEHLG, 2006) (DoEHLG 2006 Guidelines) and the Draft Wind Energy Guidelines (DoHPLG, 2019) (Draft DoEHLG 2019 Guidelines) also indicate that underground cables are the preferred option for connection of a wind energy development to the national grid. The Proposed Grid Connection Route will follow the route of existing public roads, thereby minimising the amount of ground disturbance required. The Proposed Wind Farm will have an estimated maximum exporting capacity of 46.2MW; this is such that it can connect to either 38kV substation or a 110kV substation using a step-up transformer. The existing 110kV Ardnacrusha substation was identified as being the only viable option for connection to the National Grid. The following options for connecting the Proposed Project to the national grid were considered:

- Options 1a: UGC route from onsite 38kV substation to Ardnacrusha (route length 14.7km)

- Option 1b: UGC route from onsite 38kV substation to Ardnacrusha, (route length 15.2 km)
- Option 1c: UGC route from onsite 38kV substation to Ardnacrusha, (route length 20.4km)

Option 1 was chosen as the most viable option when taking into account watercourse crossings, route length, congestion of existing services.

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 site. Regarding the selection of a transport route to the Proposed Wind Farm, alternatives were considered in relation to turbine components, general construction related traffic and site access locations.

Wind turbine components will be delivered from the Port of Foynes (Shannon) to the Proposed Wind Farm. Key considerations in determining the turbine delivery route are road widening requirements, modifications to street furniture, vertical alignment of roads, and structural assessment of road infrastructure due to the abnormal sized loads of wind turbine components. Collett were engaged by the Applicant to carry out a preliminary assessment on the proposed turbine delivery routes for the Proposed Project. It was deemed suitable that the turbines be delivered from the Port of Foynes (Shannon), however there were 2 no. options considered for the entrance into the site.

Turbine Delivery Route A – Chosen Option utilises, insofar as possible, the existing road network that exists within the vicinity of the Proposed Wind Farm site. This route accesses the site via an existing road network through Kilbane village and the L7080 Local Road. This approach was deemed the most environmentally prudent as it made use of the existing road network insofar as possible.

Alternative Mitigation Measures

Mitigation by avoidance has been a key aspect of the Proposed Project's evolution through the selection and design process. Avoidance of the most ecologically sensitive areas and geotechnically unsuitable areas of the site limits the potential for environmental effects. As noted above, the layout aims to avoid any environmentally sensitive areas. Where loss of habitat occurs in the site, this has been mitigated with the proposal of habitat enhancement and improved habitat connectivity with hedgerow replanting within the Proposed Wind Farm site.

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

1.4 Description of the Proposed Project

This section of the Environmental Impact Assessment Report (EIAR) describes the Proposed Project and all its component parts. An application for the proposed development (as described in Section 1.1 of this document) will be submitted to Clare County Council. This chapter also describes elements of the overall project which are not subject to this planning application but are assessed in this EIAR. Construction methodologies for the main infrastructural components of the development are also included in this chapter (or its associated appendices) of the EIAR.

The Proposed Project includes for an onsite 38kV electricity substation and battery energy storage solution and underground grid connection cabling, connecting the onsite substation to the national electricity grid via the existing Ardnacrusha 110kV electricity substation located in the townlands of Castlebank and Ballykeelaun. The cabling will be located within the public road corridor or existing tracks for its entire length. The total length of the Proposed Grid Connection Route is approximately 14.7km, the full length of the Proposed Grid Connection

Route is located within Co. Clare. To ensure clarity, the Proposed Grid Connection Route will be the subject of a separate future planning application to CCC.

All elements of the Proposed Project in the list above, and described in this chapter, have been assessed as part of this EIAR.

The proposed wind turbine layout has been optimised using wind farm design software (WindPro) to maximise the energy yield from the Proposed Project, while maintaining sufficient distances between the proposed turbines so as 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	ITM Coordinates		Top of Foundation Elevation (m OD)
	X (ITM)	Y (ITM)	
T1	562207	673988	230
T2	562283	673588	187
T3	564015	673305	366
T4	563865	672753	291
T5	563990	672374	295.5
T6	563315	672290	201
T7	563402	671882	202

The proposed wind turbines to be installed on the site will have the following dimensions:

- Turbine Tip Height – Maximum height 180 metres, Minimum height 179.5 metres
- Hub Height – Maximum height 105 metres, Minimum height 102.5 metres
- Rotor Diameter - Maximum diameter 155 metres, Minimum diameter 149 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 Proposed Project site will be conventional three-blade turbines, that will be geared to ensure the rotors of all turbines rotate in the same direction at all times.

For the purposes of this EIAR, a rated output of 6.6MW has been chosen to calculate the power output of the proposed 7-turbine renewable energy development, which would result in an estimated installed capacity of 46.2MW.

The Proposed Project site makes use of the existing road network insofar as possible. It is proposed to upgrade approximately 2.09 kilometres of existing site roads and tracks, and to construct approximately 3.9 kilometres of new access road on the Proposed Wind Farm site. It is proposed to construct passing bays along the proposed access road network.

Each turbine will be connected to the on-site electricity substation via underground 20kV or 33kV (kilovolt) electricity cabling. Fibre-optic cables will also connect each wind turbine and the met mast to the onsite substation. The electricity and fibre-optic cabling connecting to the onsite substation compound will be run in

cable ducts in the road or direct buried alongside the internal tracks approximately 0.9 metres beneath ground level to the top of the cable.

One meteorological (met) mast is proposed as part of the Proposed Wind Farm. The met mast will be equipped with wind monitoring equipment at various heights.

One temporary construction compound will be located within the Proposed Project site. The construction compound will be located on the opposite side of the L7080 Local Road. The temporary construction compound will consist of a bunded refuelling and containment area for the storage of lubricants, oils, and site generators etc, and full retention oil interceptor, waste storage area, temporary site offices, staff facilities and car-parking areas for staff and visitors.

It is proposed to construct an onsite 38kV substation within the Proposed Wind Farm site. The proposed onsite 38kV substation is located within an area of forestry and will be accessed via the internal Proposed Project site road network. The footprint of the proposed onsite 38kVsubstation compound measures approximately 4512 square metres in area and will include 1 no. control buildings and the electrical substation components necessary to consolidate the electrical energy generated by each wind turbine and export that electricity from the onsite 38kV substation to the national grid.

The construction of the Proposed Project will require the excavation of peat and spoil. The quantities of peat and spoil, requiring management on the site of the Proposed Project has been calculated, as presented in Table 4-2 of Chapter 4 of this EIAR. The quantities were calculated as part of the *Peat and Spoil Management Plan* included as Appendix 4-2 of this EIAR.

As part of the Proposed Project, tree felling will be required within and around development footprint to allow for the construction of the turbine bases, access roads underground cabling, and other ancillary infrastructure. Further details on tree felling required within and around development footprint on the Proposed Project site is detailed in Chapter 6 of this EIAR. A total of 13.8 hectares of forestry will be permanently felled within and around the Proposed Project along with existing treeline boundaries.

The commercial forestry felling activities required as part of the Proposed Project will be the subject of a Limited Felling Licence (LFL) application to the Forest Service in accordance with the Forestry Act 2014 and the Forestry Regulations 2017 (SI 191/2017) and as per the Forest Service's policy on granting felling licenses for wind farm developments.

It is proposed to access the Proposed Project site during both the construction and operational phase via a number of entrances off the L7080 Local Road. 1 no. of these entrances is an existing agricultural entrance which will be widened to facilitate the movement of construction and operational traffic. The proposed works will result in 4 no. permanent site access points from the L7080 Local Road, which will also form the main site entrances to the Proposed Wind Farm during the operational phase.

In order to facilitate the construction of the Proposed Project, all crushed stone and hardcore materials needed to construct the Proposed Wind Farm infrastructure will be sourced from the cut exercise, with any surplus material needed being sourced from the proposed onsite borrow pit. Any ready-mix concrete that will be required during the construction phase will be sourced from local, appropriately authorised quarries

It is estimated that the construction phase of the Proposed Project will take approximately 18-24 months from commencement of civil works to the commissioning of the wind turbines. The construction phase can be broken down into three main phases, which overlap partially and will take approximately 18-24 months to complete 1) civil engineering works - 10 months, 2) electrical works including grid connection works - 9-12 months, and 3) turbine erection and commissioning - 8 months.

The Proposed Project is expected to have a lifespan of approximately 35 years. As part of the Proposed Project planning application, permission is being sought for a 35-year operation period commencing from the date of full operational commissioning of the Proposed Wind Farm. During the operational period, on a day-to-day basis the wind turbines will operate automatically, responding by means of meteorological equipment and

control systems to changes in wind speed and direction. Following the end of the turbines' useful life, the equipment may be replaced with a new technology, subject to planning permission being obtained, or the site may be decommissioned fully. The underground electrical cabling and onsite 38kV substation will remain in place as it will be under the ownership and control of the ESB and EirGrid.

1.5 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 this chapter 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.

In order to assess the population in the vicinity of the Proposed Wind Farm, the Population Study Area for the population section of this EIAR was defined in terms of the District Electoral Divisions (DEDs) within which the Proposed Wind Farm is located. The Proposed Wind Farm site lies solely within the Lackareagh, Fahymore and Killokennedy DEDs as shown in Figure 5-1. These DEDs will collectively be referred to hereafter as the Population Study Area for this chapter.

The Population Study Area has a total population of 655 as of 2022 and comprises a total land area of approximately 60.4km² (Source: CSO Census of the Population 2022).

Current land-use on the Proposed Wind Farm site comprises coniferous forestry and agriculture. Current land-use along the Proposed Grid Connection Route comprises of public road corridor, public open space, coniferous forests, pastures, and land principally occupied by agriculture with significant areas of natural vegetation. Land-use in the wider landscape of the site comprises a mix of agriculture, quarrying, low density residential and commercial forestry.

The design, construction and operation of the wind farm will provide employment for technical consultants, contractors, and maintenance staff. Approximately, 80-100 jobs could be created during the construction, operation, and maintenance phases of the Proposed Project. The construction phase of the wind farm will last between approximately 18 - 24 months. The majority of construction workers and materials will be sourced locally, thereby helping to sustain employment in the construction trade.

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 impacts of wind farms on property prices, the available literature demonstrates that at an international level, wind farms have potential to impact property values in local areas; however, it is important to note that this impact is proven to reduce throughout the operational phase of a wind farm.

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, and 3) Visual Amenity and 4) Telecommunications. Shadow flicker, telecommunications 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 DoEHLG 2006 Guidelines and the '*Best Practice Guidelines for the Irish Wind Energy Industry*' (Irish Wind Energy Association, 2012). The adopted DoEHLG 2006 Guidelines

are currently under review. The Draft DoEHLG 2019 Guidelines recommend local planning authorities and/or An Bord Pleanála impose conditions to ensure that:

> *"no existing dwelling or other affected property will experience shadow flicker as a result of the wind energy development subject of the planning application and the wind energy development shall be installed and operated in accordance with the shadow flicker study submitted to accompany the planning application, including any mitigation measures required."*

The DoEHLG 2006 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 DoEHLG 2006 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 maximum rotor diameter proposed for this project is 155m. As such, the Shadow Flicker Study Area in this case is 1.55km. A significant minimum separation distance of 720m from third party dwellings has been achieved with the project design. There are 64 no. properties located within 1.55 km of the proposed turbines as detailed above, of which 1 dwelling is in a derelict condition.

The potential shadow flicker occurring at sensitive receptors located within the Shadow Flicker Study Area was calculated using the WindFarm computer software (version number 5.0.2.2) and a regional sunshine factor of 30.56% was applied. Of the 64 no. sensitive receptors modelled, it is predicted that 45 no. sensitive receptors may potentially experience daily and annual shadow flicker, in the absence of mitigation measures. Chapter 5 outlines the mitigation strategies which may be employed at the potentially affected properties to ensure that the Draft DoEHLG 2019 Guidelines are complied with at any dwelling within the 1.55km Shadow Flicker Study Area. Therefore, the developer will commit to mitigation measures that will ensure that there are no occurrences of shadow flicker for any property within the 1.55km Shadow Flicker Study Area, as a result of the Proposed Wind Farm.

Impacts on human beings during the construction, operational and decommissioning phases of the Proposed Project 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.

1.6 Biodiversity

This chapter assesses the likely significant effects (both alone and cumulatively with other projects) that the Proposed Project may have on Biodiversity. Mitigation by design was applied to the finalised Proposed Project layout wherever possible to avoid impacts on Biodiversity. This chapter sets out the mitigation measures proposed to avoid, reduce or offset any potential significant effects that are identified. The residual impacts on biodiversity are then assessed. Particular attention has been paid to species and habitats of ecological importance. These include species and habitats with national and international protection under the Wildlife Acts 1976 (as amended), EU Habitats Directive 92/43/EEC. Impacts on avian features are considered in Chapter 7 of this EIAR.

Comprehensive surveys of the biodiversity within the EIAR Site Boundary were undertaken to inform this Biodiversity Chapter of the EIAR. The following sections fully describe the ecological surveys that have been undertaken and provide details of the methodologies and guidance followed. Surveys carried out within the Proposed Wind Farm site were carried out between September 2022 and March 2024. An assessment of the Proposed Grid Connection Route was also undertaken on the 5th of January 2023. Surveys along the route comprised a multi-disciplinary walkover, otter surveys at watercourse crossings as well as an assessment of bat foraging, commuting and roosting habitat. Infrastructure at five of these watercourse crossing points was further assessed for potential to support roosting bats (further detailed provided in Bat Report, Appendix 6-2).

The multi-disciplinary walkover surveys comprehensively covered the lands within the EIAR Site Boundary and based on the survey findings, further detailed targeted surveys were carried out for features of ecological significance. These surveys were carried out in accordance with NRA Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes (NRA, 2009). During the multidisciplinary surveys, a search for Invasive Alien Species (IAS) listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015) was conducted.

Dedicated species specific surveys including for bats, marsh fritillary, and protected mammals were carried out, during which any incidental records of other species were also recorded. In addition, fisheries surveys and aquatic macroinvertebrate surveys were undertaken by Triturus Environmental Ltd. as part of the detailed baseline assessment, the results of which are provided in technical appendices to this EIAR.

The Proposed Wind Farm site comprises predominantly of agricultural land categorised as improved agricultural grassland (GAI) and/or wet grassland (GS4) and forestry categorised as either conifer plantation (WD4) or recently felled (conifer) woodland (WS5). These were the two dominant habitat types recorded throughout the Proposed Wind Farm site. Areas of scrub (WS1) and dense bracken (HD1) are associated with the outskirts of agricultural grassland areas and overgrown hedgerows in the case of hardstanding areas for Turbines 6 and 7 and proposed new roads and upgrades to existing road. Areas of Wet heath (HH3) with mosaics of Upland blanket bog (PB2) are situated in the south-east and north-east of the Proposed Wind Farm site, north of T3 and south of T5 (Plate 6-7). These habitats have links with Annex I habitats; please note, no works are proposed to take place in these areas. Three watercourses were recorded within the Proposed Wind Farm site all of which drain to the west and south-west of the Proposed Wind Farm site. All three watercourses within the Proposed Wind Farm site were classed as upland eroding streams (FW1).

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) comprises recently felled woodland (WD5), improved agricultural grasslands (GA1), dry meadows and grassy verges (GS2), drainage ditches (FW4), stone walls and other stonework (BL3), scrub (WS1), hedgerows (WL1) and treelines (WL2). The Proposed Grid Connection Route will involve 3 No. bridge crossings and 8 no. existing culverts crossings.

The Proposed Project of approx. 247meters of treeline and 2104m of hedgerow (and associated stone wall) to enable widening of the existing access track into the Proposed Wind Farm. Only the northern section of hedgerow/stone wall will be removed. The Proposed Project will result in the temporary loss of approximately 112m of hedgerow at the turbine blade transition area within the accommodation works area. The Proposed Grid Connection Route will not result in the permanent loss of any habitat. The works will be restricted to the existing road categorised as Buildings and Artificial Surfaces (BL3). This is not significant at any geographic scale.

Measure to mitigate for this loss of habitat are incorporated into the Biodiversity Enhancement and Management Plan (BEMP) for the Proposed Project, this includes the planting of up to 2,673m of planting comprising native broadleaved trees, shrubs and hedgerow habitat within the Proposed Wind Farm site. This habitat creation will provide an establishment of approx. 890m of new native broadleaved treelines, approx. 1,240m of new native hedgerow and enhancement of approx. 550m of treelines and 530m of hedgerows via supplementary planting. Additionally, broadleaved tree planting will be undertaken along the Kilbane Stream to produce a linear woodland of approx. 1.4 ha to enhance the watercourse for fauna including bats. The planting will provide additional foraging and commuting habitat for bats within the Proposed Project site following construction. This will result in a no net loss of linear habitat features within the Proposed Wind Farm

Bat species composition and abundance within the Proposed Wind Farm site was considered to be typical of the geographic location of the site and the habitats which it supports. Although no significant bat roosts were identified within the Proposed Wind Farm footprint, the Proposed Project has the potential to result in direct and indirect effects bats. Therefore, bats are included as a Key Ecological Receptor (KER) for further assessment. All bat species (excluding *Myotis spp.)* recorded within the Proposed Project site were considered to be part of bat populations of Local Importance (Higher Valu on the basis that the habitats within the site are utilised by regularly occurring bat populations of Local Importance. The Proposed Project site consists primarily of conifer plantation which does not provide roosting habitat of significance for bats. The habitats on the

Proposed Wind Farm site will remain suitable for bats and no significant displacement of individuals or populations is anticipated. Taking into consideration the sensitive design of the Proposed Project, the proposed best practice and adaptive mitigation measures, significant residual effects on bats as a result of loss or damage to commuting and foraging habitat, loss of, or damage to, roosts, displacement of individuals or populations, and disturbance, are not anticipated. In relation to potential collision risk and injury with operational turbines, detailed mitigation measures in relation to bats is provided in the Bat Report (Appendix 6-2) and summarised in Chapter 6.

All watercourses within the Proposed Wind Farm site, and along the Proposed Grid Connection Route were identified as providing potential habitat for otter and were subject to targeted surveys for this species. No signs of otter were recorded within any of the watercourses within the Proposed Wind Farm site. However, signs of otter were recorded in the wider study area (see Aquatic Baseline Report) and at 1 no. location along the Proposed Grid Connection Route (Blackwater River (Clare)). Although otter as a KER has been valued of international importance (due to otter being a QI species of the downstream Lower River Shannon SAC) fragmentation impacts if they did occur in the absence of mitigation would be considered significant at the local geographic scale only as impacts would occur on the local population only. With the implementation of mitigation measures in relation to the protection of water quality during construction no significant residual effects on otter are anticipated.

Signs of badger activity were recorded within the Proposed Wind Farm site comprising dis-used setts, latrines, scat and snuffle holes. Badger activity was mainly concentrated in the northwest of the site in agricultural grasslands and field boundaries nearby turbines T1 and T2. Signs of badger in the form of a latrine and scat were also recorded in an area of scrub in the south-east of the site, north of T6. Further snuffle holes were recorded in grasslands in the south-east of the site, west of T7. Dis-used badger setts and scat were recorded within north-west of the site. Four camera traps were deployed at potential mammal den/resting sites and although fauna activity was picked up on camera, no badger activity was recorded. A pre-construction badger survey will be carried out to identify the presence of any setts that may have been established in the intervening period. If an active badger sett is identified prior to construction, mitigation measures in relation to badger and detailed in Chapter 6 will be implemented. Following the incorporation of the mitigation measures descried in Chapter 6, no significant negative effects to badger is anticipated at any geographic scale.

With the implementation of mitigation measure in relation to the protection of surface and ground water during construction and operation of the Proposed Project as outlined in Chapter 6 and detailed in Chapter 9 (Water) no significant residual effects on surface or ground water quality, is anticipated.

In summary, the species and habitats provided National and International protection have been considered in this Ecological Impact Assessment. A detailed assessment of the likelihood of the Proposed Project having either a significant effect or an adverse impact on any relevant European Sites (i.e. SACs, cSACs4, SPAs or cSPAs) has been carried out in the Appropriate Assessment (AA) Screening Report and Natura Impact Statement. A separate assessment has not been carried out in this chapter, to avoid duplication of assessments.

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

The potential for effects on the European Designated Sites is fully described in the Natura Impact Statement (NIS) that accompanies this application. The NIS concludes that in view of best scientific knowledge and on the basis of objective information, the Proposed Project either individually or in combination with other plans or projects, is not likely to have adverse effects on the European Sites that were assessed as part Appropriate Assessment process. Similarly, with the prescribed mitigations in place, there is no potential for impact on any nationally designated site.

Provided that the Proposed Project 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 KERs

1.7 Birds

This chapter assesses the likely significant effects that the Proposed Project may have on bird species. Firstly, a brief description of the Proposed Project 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 Project on bird species. The survey data is presented in full in the Environmental Impact Assessment Report (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 Project are then described in terms of the construction, operation and decommissioning phases of the project. An accurate prediction of the effects is derived following a thorough understanding of the nature of the Proposed Project 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 Project upon birds will not be significant. Effects associated with habitat loss, disturbance displacement, collision risk and cumulative effects have been assessed to be no greater than long-term slight negative effect (EPA, 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 Project are foreseen on key ornithological receptors of the study area.

1.8 Land, Soils and Geology

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

The land, soils and geology of the Proposed Project site has been characterised using a combination of desk study and site investigation data. Several walkover inspections of the Proposed Wind Farm have been completed as well as 67 no. peat probes, gouge cores, 14 no. trial pits, 3 no. rotary boreholes and laboratory analysis of recovered soil samples. A visual assessment of exposed soils, subsoil and bedrock and topographic changes along the Proposed Grid Connection Route was also completed.

Proposed Wind Farm

The Proposed Wind Farm is located in the Slieve Bernagh Mountain Range and contains some very steeply sloping topography with ground elevations ranging from ~90 to ~440mOD (metres above Ordnance Datum). Land at the Proposed Wind Farm currently comprises of agricultural lands in the west and existing forestry plantations in the east/northeast.

Site investigations have revealed that peat is not widespread at the Proposed Wind Farm site. Where present, the peat is typically shallow with the recorded peat depths ranging from 1 to 3m, with an average of 0.52m. Only 1 no. peat probe encountered peat in excess of 2m. The non-peat soils and subsoils encountered during the site investigations comprised of glacial till described as sandy, gravelly silty clat with occasional gravels. The local GSI mapped subsoils consist of till derived from Lower Palaeozoic and Devonian sandstones with some gravels in the southwest.

Depth to bedrock is relatively shallow across the Proposed Wind Farm with some bedrock exposures of sandstone and siltstone recorded during walkover surveys. The rotary boreholes encountered medium strong massive grey fine grained well cemented Greywacke at depths ranging from 2.2 to 2.5mbgl (metres below ground level).

The Proposed Project will typically involve the removal of peat (where present), subsoils (spoil) and the excavation of bedrock for the construction of the internal cable network, hardstanding emplacement, turbine foundations, substation, crane hardstands and construction compounds. Rock for construction purposes will be imported from nearby quarries and sand and gravel pits.

Estimated volumes of peat and spoil to be excavated within the Proposed Wind Farm are in the region of 41,010m^3 and 150,000m^3 respectively. Excavated peat and spoil will be stored in the proposed peat/spoil deposition areas with minor volumes being used for landscaping. 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.

Rock will be excavated at the proposed borrow pit location and along access roads for the construction of turbine foundations. Estimated volumes of peat and spoil to be excavated from the proposed borrow pit are approximately 1,438m^3 and 5,750m^3 respectively. The rock will be reused on site to facilitate the construction of the Proposed Project. Excavated spoil material will also be reused throughout the site as fill material to facilitate construction.

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

A Geotechnical and Peat Stability Assessment was undertaken for the Proposed Wind Farm site (Appendix 8-1), and it demonstrates an acceptable margin of safety, that the site is suitable for the Proposed Project and is

considered to be at low risk of peat failure. A number of control measures are given in the peat stability assessment to manage all risks associated with peat instability.

The Proposed Project has a very small development footprint when compared to the overall area of the Proposed Wind Farm site. Therefore, no significant effects on land will occur during the construction, operation or decommissioning phases of the Proposed Project.

The peat and mineral soil/subsoil deposits at the Proposed Wind Farm site are not designated in this area (i.e. they do not form part of a designated site). For this reason, and with the implementation of the mitigation measures detailed in this EIAR and the best practice measures detailed in the Peat and Spoil Management Plan, no significant effects on peat and soils will occur during the construction, operation or decommissioning phases of the Proposed Project.

Similarly, with the implementation of the mitigation measures outlined in this EIAR, no significant effects on the underlying bedrock geology will occur during the construction, operation, or decommissioning phases of the Proposed Project.

An assessment of potential cumulative effects associated with the Proposed Wind Farm and other developments on land, soils and geology has been completed. The land, soils and geology assessment confirms there will be no significant cumulative effects on land, soil and geology as a result of the Proposed Wind Farm.

Turbine Delivery Route

The Turbine Delivery Route includes a proposed blade transition area along the R466 in the townland of O'Briensbridge, ~1km southeast of the small village of Bridgetown in east Co. Clare.

Minor excavation of soils and subsoils will be required at this location. 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.

Proposed Grid Connection Route

The Proposed Grid Connection Route underground cabling travels from the proposed onsite 38kV substation to the existing Ardnacrusha 110kV substation, is ~14.7km in length and is located within the carriageway of the existing public road network.

Excavation of soil, subsoil and bedrock will be required for the formation of trenches to accommodate the underground electrical cabling connection. This will result in the removal of some soil and subsoil at most excavation locations, however the majority of the soil and subsoil will be reinstated within the trench. However, some of the excavated materials will be transferred to an appropriately licenced facility as required. This is dependent on the road makeup at locations along the underground electrical cabling route. Storage and handling of hydrocarbons/chemicals will be carried out using best practice methods. Measures to prevent soil and subsoil erosion during excavation and reinstatement will be undertaken to prevent water quality impacts.

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

The land, soils and geology assessment confirms there will be no significant cumulative effects on land, soil and geology as a result of the Proposed Grid Connection Route.

1.9 Water

This chapter assesses the likely significant effects that the Proposed Project 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.

Proposed Wind Farm

The Proposed Wind Farm site is drained by several 1st and 2nd order streams. These natural watercourses originate within the EIAR Site Boundary and flow downslope before discharging into the Ardcloony River to the east and the Broadford River to the southwest. In places, the natural drainage is further facilitated by a network of manmade drains. The nature of these drains depend on the local land use. In agricultural areas of the Proposed Wind Farm site, manmade field drains are located along many of the local field boundaries and hedgerows and connect to downstream natural watercourses. Manmade drains are also located along sections of the existing roads. The forestry plantations in the east of the Proposed Wind Farm contain a network of forestry drains that are typically spaced every 15 to 20m. The forestry drainage network discharges into local natural watercourse which drain the area.

Regionally, the east of the Proposed Wind Farm site is located in the Lower Shannon surface water catchment and drains to the Ardcloony River. The Ardcloony River discharges into the Lough Derg downstream of the Proposed Wind Farm. Meanwhile, the west of the Proposed Wind Farm site is located in the Shannon Estuary North surface water catchment and drains to the Glenomra River. The Glenomra River flows past Broadford, downstream of which it is known as the Broadford River. This river discharges into Doon Lough, with the outfall from this lake being the Owenogarney River.

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 Project site during the construction and operational phases of the Proposed Project and measures are proposed within the EIAR to deal with these potential minor local impacts.

During each phase of the Proposed Project (construction, operation, and decommissioning) a number of activities will take place at the site, some of which will have the potential to significantly affect the hydrological regime or water quality at or downstream of the Proposed 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 buffer was used during the design of the Proposed Project, 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.

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 Wind Farm 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 Project drainage system will be designed to slow

surface water runoff from the proposed site by providing greater attenuation. This will ensure that the Proposed Project 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 Project.

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 Project. 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 Project. The Proposed Project 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 Project 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 Proposed Wind Farm.

Turbine Delivery Route

The Turbine Delivery Route extends from Foynes Port to the Proposed Wind Farm site. The TDR includes a blade transition area along the R466 which will facilitate the offloading of the turbine blades, which will be placed onto blade adapter vehicles.

Minor excavation of soils and subsoils will be required at the blade transition areas. 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.

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

Proposed Grid Connection Route

The Proposed Grid Connection Route from the proposed onsite 38kV substation to the existing Ardnacrusha 110kV substation is ~14.7km and is located entirely along the existing local public road corridor.

The northern section of the Proposed Grid Connection Route, in the vicinity of the Proposed Wind Farm site is mapped in the Shannon Estuary North surface water catchment and there are 3 no. watercourse crossings over EPA mapped rivers and streams in this area. Meanwhile, the vast majority of the Proposed Grid Connection Route is mapped in the Lower Shannon surface water catchment, with 1 no. crossing over the EPA mapped Blackwater River along the R463 at Blackwater Bridge.

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 2.4km of the Proposed Grid Connection Route 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 Proposed Grid Connection Route 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.

1.10 Air Quality

This chapter identifies, describes and assesses the potential significant direct and indirect effects on air-quality arising from the construction, operation and decommissioning of the Proposed Project.

The Environmental Protection Agency (EPA) has designated four Air Quality Zones for Ireland:

- Zone A: Dublin
- Zone B: Cork
- Zone C: Other cities and large towns comprising Limerick, Galway, Waterford, Drogheda, Dundalk, Bray, Navan, Ennis, Tralee, Kilkenny, Carlow, Naas, Sligo, Newbridge, Mullingar, Wexford, Letterkenny, Athlone, Celbridge, Clonmel, Balbriggan, Greystones, Leixlip and Portlaoise
- Zone D: Rural Ireland, i.e., the remainder of the State excluding Zones A, B and C

These zones were defined to meet the criteria for air quality monitoring, assessment and management described in the CAFE Directive, Framework Directive and Daughter Directives. The Proposed Project site lies within Zone D, which represents rural areas located away from large population centres.

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

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

The Institute of Air Quality Management in the UK (IAQM) guidance document '*Guidance on the Assessment of Dust from Demolition and Construction*' (2024) was considered in the dust impact assessment. The use of UK guidance is considered best practice in the absence of applicable Irish guidance, and was used to predict the likely risk of dust impacts as a result of the construction works.

A Construction and Environmental Management Plan (CEMP) will be in place throughout the construction phase (see Appendix 4-4 of the EIAR) and includes dust suppression measures. Following implementation of the mitigation measures detailed in Chapter 10, there will be no significant direct or indirect effects on air quality due to the construction of the Proposed Project. The overall residual effect on air quality will be a long-term moderate positive effect on air quality due to the offsetting of approximately 35,565 tonnes of CO_2 per annum (see Chapter 11 for details), due to the provision of renewable energy in the range of approximately 35,770 Irish households with electricity per year.

No significant effects on air quality will occur during the construction, operation or decommissioning of the Proposed Project.

1.11 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 Project.

The production of energy from wind turbines has no direct greenhouse gas emissions as is expected from fossil fuel-based power. Harnessing more energy by means of wind farms, and other renewable sources, 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 May 2024, the Environment Protection Agency (EPA) released '*Ireland's Greenhouse Gas Emissions Projections 2023-2050'*. 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 latest EPA projections show that currently implemented policies and measures (WEM) will result in Ireland achieving a total GHG reduction of 9% on 2005 levels by 2030, significantly short of Irelands 2030 target under the EU Effort Sharing Regulation (ESR), i.e., 42% reduction of emissions compared to 2005 levels by 2030, and also lower than the 10% reduction projected in the 2023 report.[1] If policies and measures in the higher ambition (WAM) scenario are implemented, EPA projections show that Ireland can achieve a reduction of 25% by 2030, still short of the 42% reduction target and also lower than the 30% reduction projected in last year's estimates. The EPA projections show that agriculture and transport emissions form the majority of ESR emissions; combined they represent 78% and 80% of emissions in 2022 (latest inventory data) and 2030, respectively. Decarbonisation of power generation is a key measure, not only in the energy sector, but for other energy intensive sectors, such as transport and agriculture, whose activities result in high levels of GHG emissions.

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 Project 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.

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[1] *Irelands Greenhouse Gas Emission Projections 2022-2024 (June 2023)* <https://www.epa.ie/publications/monitoring-assessment/climate-change/air-emissions/EPA-GHG-Projections-2022-2040_Finalv2.pdf>

[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

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 Project will result in the loss of 82,145tCO_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 Project will likely be less then the values provided in Table 11-6 of Chapter 11.

The Proposed Project will have an export capacity of approximately 46.2MW and therefore will help contribute towards the achievement of national and international emission reduction targets, provide much needed grid infrastructure, and the capacity to offset 32,565tCO_2e per annum, or 1,139,775tCO_2e over its operational lifetime, thereby reducing the greenhouse gas effect. Carbon losses to the atmosphere due to changes in soil and ground conditions and due to the construction and operation of the Proposed Project will be offset by the Proposed Wind Farm in approximately **30** months of operation. Please see Section 11.5.3.2 for details on carbon savings/offset calculations.

1.12 Noise and Vibration

A noise and vibration assessment was undertaken to determine the likely significant effects from the construction, operational and decommissioning phases of the Proposed Wind Farm, at nearby noise sensitive receptors (residential properties).

A comprehensive background noise survey was undertaken at seven noise monitoring locations. The data was analysed in conjunction with onsite measured wind speed data.

Predicted construction noise levels at the nearest noise sensitive receptors during all phases of construction are below the threshold values within BS 5228 and that predicted levels would be short term. Construction vibration would also likely be at low levels and would be short term. Therefore, the effect from construction noise and vibration is deemed to be not significant. Activities related to decommissioning would use similar plant to that used for construction activities and would occur at the same locations, as such noise level output during the decommissioning phase is expected to be no higher than the construction phase.

The operational noise assessment was undertaken in three stages, which involved setting the Total DoEHLG 2006 Guidelines Noise Limits (which are limits for noise from all wind farms in the area) at the nearest noise sensitive receptors (NSRs), predicting the likely effects (undertaking cumulative noise predictions) and finally setting Site-Specific Noise Limits for the operation of the Proposed Wind Farm on its own. The Total DoEHLG 2006 Guidelines Noise Limits have been derived in relation to background noise levels and other applicable criteria in accordance with the DoEHLG 2006 Guidelines.

Predicted cumulative operational noise levels indicate that for noise sensitive receptors neighbouring the Proposed Wind Farm, cumulative wind turbine noise (which considers noise predictions from all nearby operational and permitted wind farms and the Proposed Wind Farm) would meet the Total DoEHLG 2006 Guidelines Noise Limits at all Noise Assessment Locations.

The Total DoEHLG 2006 Guidelines Noise Limit is applicable to all operational and permitted wind farms in the area. Therefore, Site-Specific Noise Limits have also been derived to control the specific noise from the Proposed Wind Farm. In accordance with the guidance in IOA GPG, the Site-Specific Noise Limits have been derived with due regard to cumulative noise by accounting for the proportion of the Total DoEHLG 2006 Guidelines Noise Limit which is potentially being used by other nearby developments. The Site-Specific Noise Limits have been derived in accordance with the IOA GPG.

Predictions of Proposed Wind Farm turbine noise have been made in accordance with good practice using three candidate wind turbines with serrated trailing edge blades, a 149-155m rotor diameter range and a hub height of 102.5-105 m. Predicted operational noise levels from the Proposed Wind Farm indicate that for noise sensitive receptors neighbouring the Proposed Wind Farm, wind turbine noise from the Proposed Wind Farm would meet the Site-Specific Noise Limits at all Noise Assessment Locations (NAL) and are therefore deemed to be not significant. In order to meet the noise limits at one receptor, mode management would be required for a limited range of wind speeds and wind directions based on the three candidate turbines considered in this assessment.

The use of Site-Specific Noise Limits would ensure that the Proposed Wind Farm could operate concurrently with other operational wind farm developments in the area and would also ensure that the Proposed Wind Farm's individual contribution could be measured and enforced if required.

The three candidate wind turbine models were chosen in order to allow a representative assessment of the noise impacts. Should the Proposed Wind Farm receive planning permission, the final choice of wind turbine would be subject to a competitive tendering process. The final choice of wind turbine would, however, have to meet the noise limits determined and contained within any condition imposed.

Predicted noise levels from the BESS indicate there would be no significant effects at all BNALs, except BNAL06 where a minor significant effect is predicted during the nighttime.

1.13 Landscape and Visual

Chapter 13 of this EIAR presents the LVIA of the Proposed Project comprising 7 no. (northern turbines T1 and T2; southern turbines T3–T7), focusing on comprehensive assessment of the proposed turbines as the essential aspect of the Proposed Project likely to give rise to significant landscape and visual effects within a 20km study area – 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. This Chapter presented the landscape and visual baseline conditions of the Proposed Project site and wider LVIA Study Area, outlined the local policy context with respect to landscape and visual designations, calculated the ZTV to identify the landscape areas and visual receptors needing assessment and evaluated the cumulative context of landscape and visual effects in combination with other existing, permitted and proposed wind farm developments in the LVIA Study Area.

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

- EIAR Volume 2: Photomontage Booklet, presenting existing and cumulative imagery of the Proposed Project turbines in multiple fields of view from 15 no. representative viewpoints in the study area;
- Appendix 13-1: LVIA Methodology, outlining the detailed methodology of the assessment conducted in this chapter;
- Appendix 13-2: LCA Assessment Tables, assessing landscape, visual and cumulative effects of 6 no. LCAs in the study area;
- Appendix 13-3: Photomontage Visual Impact Assessment Tables, assessing landscape, visual and cumulative effects of the 15 no. representative viewpoints presented in the Photomontage Booklet;

- Appendix 13-4: A0 LVIA Baseline Map, showing all baseline landscape features, viewpoints, and visual receptors;
- Appendix 13-5: Photowire Visualisation Booklet, presenting 18 no. supplemental photowire locations throughout the study area that demonstrate representative views of the proposed turbines.

The Proposed Wind Farm is located in LCA-8 Slieve Bernagh Uplands of Co. Clare. The Proposed Wind Farm is sited within a combination of low-intensity agricultural land and coniferous forestry which has been highly altered by human activity, with all 7 no. turbines sited within an area that is 'Open to Consideration' for wind development as designated by the local planning policies CCDP and CWES of Co. Clare. LCA-8 Slieve Bernagh Uplands is afforded the lowest sensitivity rating to wind energy development by the CCDP and CWES.

The siting and design of the Proposed Project are found to comply with development guidelines for wind energy (WEDGs, DoEHLG, 2006; and Draft WEDGs, DoHPLG, 2019) in terms of its location in a 'Transitional Marginal Landscape' type; this includes adherence to the 4-times-tip-height set-back distance from residential visual amenity set out in the Draft Revised WEDGs. The Proposed Project is compliant with appropriate siting and design guidance for Transitional Marginal Landscape in relation to the spatial extent, the spacing and layout of northern and southern turbines, the height and scale of the proposed turbines within the landscape, and capacity of the wider landscape setting to absorb cumulative wind energy developments.

Imagery was captured from a total of 33 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 receptors scoped in for assessment during preliminary analysis using ZTV mapping. Out of 33 total, 15 no. viewpoints (VP01—VP15) were selected for photomontage production and full visual impact assessment in the EIAR Volume 2: Photomontage Booklet accompanying this Chapter, and the remaining 18 no. viewpoints (PW-A to PW-R) were produced as draft-stage photowires to aid in visual impact discussions, presented in Appendix 13-5: Photowire Visualisation Booklet.

A total of 23 no. visual receptors in the LVIA Study Area were identified and assessed for the effects of visual impact, comprising 4 no. designated Scenic Routes and Views, 1 no. OSi Viewing Area, 6 no. settlements, 2 no. recreational routes (i.e. walking trails), 1 no. cultural heritage destination and 9 no. prominent transport routes. These are represented within the 15 no. selected photomontage viewpoints (Photomontage Booklet) and 18 no. photowire viewpoints (Appendix 13-5).

6 no. designated LCAs were selected and comprehensively assessed for landscape and visual effects within the LVIA Study Area: 3 no. from Co. Clare, 1 no. from Co. Limerick and 2 no. from Co. Tipperary. The LCA in which the Proposed Project site is located is LCA-8 Slieve Bernagh Uplands, found to have 'Low' sensitivity, a 'Moderate' magnitude of change, giving a final overall significance rating of 'Slight'.

The assessments reported in this Chapter determined that the proposed turbines have limited visibility from receptors and other LCAs outside of the enclosure of the Glenomra Valley (located within LCA-8). When visibility does occur from other LCAs in the wider landscape, the proposed turbines are seen to be well set-back within another landscape area, thus having very minimal impact on the key characteristics and sensitivities of the other LCAs. For all other LCAs, the effects were found to have significance ratings of 'Imperceptible' to 'Not Significant'.

Of the 15 no. viewpoints selected and comprehensively assessed for landscape and visual effects, six were located within 5km of the Proposed Wind Farm. Five viewpoints (the majority) were found to have 'Not Significant' residual visual effects. The remaining viewpoints were found to have 'Moderate' (4 no.) and 'Slight' (3 no.) residual visual effects. No effects were found to be 'Profound' or 'Very Significant' at any viewpoint locations. 3 no. viewpoints had residual visual effects rating as 'Significant'; these were:

- VP04: Scenic Route SR-26 Cloonyconry More;
- VP13: Killeagy/East Clare Way;
- VP14: Kilbane.

The key mitigation factors contributing to the residual visual effects ratings were:

- The Proposed Wind Farm meets the conditions of good windfarm design for 'Transitional Marginal Landscape' character type according to the WEDGs (DoEHLG, 2006) and Draft Revised WEDGs (2019, DoPHLG);
- The Proposed Wind Farm meets the conditions of required set-back from housing according to the WEDGs (DoEHLG, 2006) as well as the 4-times-tip-height set back prescribed for residential visual amenity in the Draft Revised WEDGs (2019, DoPHLG);
- The Proposed Wind Farm is sited within LCA-8 Slieve Bernagh Uplands, a landscape character area classified in Table 4a of the CWES as having good capacity for 'absorbing' multiple (cumulative) wind farm developments and afforded the lowest sensitivity classification for LCAs in Co. Clare;
- The spatial enclosure and narrowness of the Glenomra Valley make it a relatively small visual unit, providing visual separation and screening from many visual receptors, as well as in-combination effects with other permitted and proposed wind farm developments outside the valley;
- For Scenic Route SR-26, the view is not 'seriously hindered or obstructed' from the route and the Proposed Project is 'designed and located to minimise the visual impact' from the route, thereby meeting specific wording of CCDP policy relating to development impacting designated scenic routes;
- For Kilbane village, on-site visibility appraisals and photomontage visualisation indicate localised visual screening by vegetation and buildings and appropriate scale and set-back of the proposed turbines within the setting of Glenomra Valley and the wider Slieve Bernagh range;
- For East Clare Way, an Information Lookout Point and widening of the road are proposed to improve the value and safety of the trail where it passes through the Proposed Wind Farm; moreover, the primary long-ranging views are not obstructed by the proposed turbines.

The analysis of cumulative effects identified several possibilities of potential effects arising in different cumulative scenarios (existing, permitted and proposed) with a total of 7 no. other wind energy developments identified within the LVIA Study Area:

- Permitted Carrownagowan Wind Farm (19 no. turbines);
- Permitted Fahy Beg Wind Farm (8 no. turbines);
- Proposed Knockshanvo Wind Farm (9 no. turbines);
- Proposed Oatfield Wind Farm (11 no. turbines);
- Proposed Ballycar Wind Farm (12 no. turbines);
- Existing Parteen (1 no.) and existing Vistakon (1 no.) single turbines.

Of these, the permitted Carrownagowan, permitted Fahy Beg, proposed Knockshanvo, and proposed Oatfield wind farms are located in Co. Clare within LCA-8 Slieve Bernagh Uplands, designated in wind energy zoning by the CCDP and CWES as an upland area suitable for accommodating multiple wind energy developments. The proposed Ballycar Wind Farm is also located almost entirely within LCA-8 Slieve Bernagh Uplands in Co. Clare, with 11 out of its 12 no. turbines inside the LCA border yet is situated well outside (<11km) the spatial enclosure of Glenomra Valley to the south-west.

The two single existing turbines, Parteen and Vistakon, are located outside Slieve Bernagh Uplands, in Co. Clare and Co. Limerick (respectively) in the lowlands to the south of Glenomra Valley and do not greatly contribute to cumulative effects, excepting in very occasional instances in Limerick City where in-combination effects can occur within long-ranging views towards the Slieve Bernagh Uplands in the distance.

As the Carrownagowan and Fahy Beg wind farms are permitted, they present the highest certainty of cumulative landscape and visual effects occurring in combination with the Proposed Project, explained as follows.

The permitted Carrownagowan Wind Farm is located 2.2km north of the Proposed Wind Farm, immediately outside the spatial enclosure of Glenomra Valley, with the highest peaks of Slieve Bernagh range separating the

two projects. The permitted Fahy Beg Wind Farm is located 1.3km south of the Proposed Wind Farm on the southern aspect of Lackareagh Mt, partially inside the spatial enclosure of Glenomra Valley at the valley's southern end. Cumulative visual effects will arise for receptors within Glenomra Valley where the proposed turbines will be seen in combination with permitted Fahy Beg Wind Farm turbines in and around Glennagalliagh Mt and Lackareagh Mt peaks; most of these views will likely be successional in a journey scenario due to the staggering of all turbines across ridges and upland slopes both inside and outside of the spatial enclosure of the valley. Similar cumulative visual effects may occur to a much lesser degree with the permitted Carownagowan turbines, as those turbines are located outside the spatial enclosure of the valley. The cumulative landscape effects are in line with expectations of LCA-8 Slieve Bernagh Uplands being designated as suitable for absorbing multiple wind energy developments.

As the Knockshanvo, Oatfield and Ballycar wind farms are proposed, cumulative landscape and visual effects can only potentially occur in a future receiving environment, which is an uncertain scenario, explained as follows. The proposed Knockshanvo and proposed Oatfield wind farms are located within an upland landscape at the north-western end of Glenomra Valley, near Broadford Gap. Neither development is likely to be seen from receptors in the lower lying areas of Glenomra Valley. In a few isolated instances, in-combination visual effects may potentially occur due to intervisibility of these proposed developments and the Proposed Project. The proposed Ballycar Wind Farm is outside Glenomra Valley and most likely to be visible in combination with the Proposed Project only from areas in and around Limerick City at great distance (<11km); the potential cumulative effects with proposed Ballycar are limited owing to the Proposed Project being shielded inside Glenomra Valley.

This LVIA addressed all potential cumulative interactions through the use of photomontage visualisations and written descriptions. Further, the LVIA emphasises that the probability of cumulative effects with other proposed developments is reliant upon the consenting process and multiple post-consent factors influencing whether the project is constructed.

The final proposed turbine layout of the Proposed Project was informed by an extensive iterative design process. Through this process, the proposed turbine layout was designed with potential significant effects on landscape and visual amenity and potential for cumulative effects a key consideration in the final design of the Proposed Project. In this regard, the impact assessments in this Chapter have determined that the Proposed Project is an appropriately designed wind farm. Although some significant visual impacts will occur from a small number of local residential receptors, these effects have been mitigated where possible through use of appropriate set-back distances (e.g. 720m set-back from residential dwellings, greater than 4-times-tip-height) and alignment with design guidance in the WEDGs (DoEHLG, 2006) and Draft Revised WEDGs (DoHPLG, 2019).

In conclusion, the assessments in this Chapter have determined that the scale of the Proposed Project is suitable for the landscape of Glenomra Valley within the Slieve Bernagh Uplands which is capable of effectively accommodating the Proposed Wind Farm; an upland landscape which is also designated in local planning policy as having low sensitivity and the capacity to absorb multiple wind energy developments

1.14 Cultural Heritage

This Cultural Heritage chapter was prepared by Tobar Archaeological Services Ltd. It presents the results of an archaeological, architectural and cultural heritage impact assessment of the Proposed Project. The assessment was based on desktop research, field surveys, GIS based mapping, ZTV and was also assisted by photowire/Photomontage images from certain assets/locations. A detailed examination of the available baseline data was undertaken in addition to a comprehensive site inspection. The latter comprised a walk-over survey of the Proposed Wind Farm site and any proposed infrastructure therein, along with a windscreen survey of the Proposed Grid Connection Route and accommodation areas along the proposed turbine delivery route (TDR).

No direct effects to the recorded archaeological resource are identified. Where potential effects have been identified, such as to sub-surface archaeology, appropriate mitigation measures have been recommended in order to minimise any such effects. Recommended mitigation includes pre-development archaeological testing

of the proposed infrastructure (i.e., turbine bases, hardstands, temporary construction compounds, new roads, etc) and archaeological monitoring during the construction stage of the Proposed Project.

Potential indirect effects on the setting of any UNESCO WHS 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. No UNESCO WHS or those on a Tentative List are located within 20km of the proposed turbines. Both the distance to the nearest turbine and the number of turbines visible from each cultural heritage asset were used to arrive at a level of potential effect on setting. Potential effects on setting are based on a precautionary scenario in that natural screening, boundaries, buildings and vegetation are not taken into account in the ZTV model and in reality the potential effect is likely to be less. Furthermore, many of these monuments may not be readily discernible in the landscape which further ameliorates effects on setting.

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, resource as a result of the Proposed Grid Connection Route have been identified. Some mitigation measures are recommended regarding the strapping of the cable to Blackwater Bridge which is a Protected Structure. An assessment of potential effects as a result of accommodation works along the proposed TDR was also carried out.

An assessment of potential cumulative effects was also undertaken taking into consideration other extant planning applications and existing, permitted 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 existing, permitted and proposed wind farms, no significant cumulative effects have been identified and no cumulative effects to the immediate setting of cultural heritage assets will occur.

1.15 Material Assets

Traffic and Transport

Introduction

An assessment of the traffic effects on the local highway network was undertaken for the proposed Lackareagh Wind Farm (Proposed Project). 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 Project 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 7 turbine wind farm, the proposed grid connection route linking to the existing Ardnacrusha 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 wind farm and grid connection route are located within County Clare.

The delivery route to the site for the abnormally sized loads transporting the large turbine components commences at Foynes Port in County Limerick. From Foynes Port the route turns left (south) onto the N69 National Secondary Road at the existing priority junction. From this point the route heads east on the N69 for approximately 32km to the junction with the N18 to the southwest of Limerick City. The route turns onto the N18 and heads east for approximately 3.2 km to Rossbrien where the route continues on the M7 in a northeast direction for a further 20.8 km to Junction 27of the M7 at Coolderry. At his point the route exits the motorway and turns left at the roundabout onto the R494. From this point the route heads north on the R494 for approximately 5.4km to the junction with the R496 and the new crossing of the River Shannon to the south of Killaloe and Ballina passing through the

roundabout at Birdhill. After crossing the new bridge the route turns left at the new junction between the bridge and the R463. The route then travels southwest for approximately 6.8km before turning right onto the R466. At this location it is proposed that there will be a temporary blade transition area constructed on the northeastern corner of the R463 / R466 junction for the purpose of transferring the blades, which up to this point, will travel using standard trailers, onto blade adapters, where the blades will be lifted to and angle of 60º.

The route then travels northwest on the R466 for approximately 7.6km passing through Bridgetown to the junction of the L-3022 where the route turns right onto the local road L-3022. The route then travels northeast on the L-3022 for approximately 1.3km before continuing on the L-7080 for a further 1.9km, from which the Proposed Wind Farm will be accessed.

The construction and operational entrances for all traffic generated by the Proposed Wind Farm, including the abnormally sized loads, will be via 4 proposed access junctions off the L-7080.

Once operational the access point will be gated with access permitted for maintenance staff only.

The Proposed Grid Connection Route connects the proposed on-site 38kV substation located in the townland of Killokennedy, County Clare to the existing Ardnacrusha 110kV Substation, located in the townlands of Castlebank and Ballykeelaun. The Proposed Grid Connection Route measures approximately 14.7km.

Vehicle types and network geometry

The types of vehicles that will be required to negotiate the local network will be up to 81.0 metres long and will carry a blade 77.5 metres in length.

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 Project 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 7 days when the concrete foundations are poured the effect on the surrounding road network will be negative. It is forecast that the increase in traffic volumes will range from +5.7% on the N69 east of Foynes down to +0.8% on the M7, followed by +5.8% on the R494 south of Killaloe. On the west of the River Shannon the percentage differences increase as background traffic flows decrease, with the forecast differences ranging from +9.9% on the R463 east of O'Briensbridge, to +31.2% on the R446 and + 137.9% on the L-3022 approaching the site. This will have a temporary negative effect on the delivery route with the impact forecast to be slight.

For the remaining 350 days when the general construction and groundworks are undertaken an additional 127 PCUs will travel to/from the Proposed Project. On these days it is forecast that the increase in traffic volumes will range from +1.6% on the N69 east of Foynes down to +0.2% on the M7, followed by +1.6% on the R494 south of Killaloe. On the west of the River Shannon the percentage differences are forecast to range from +2.8% on the R463 east of O'Briensbridge, to +8.7% on the R446 and + 38.6% on the L-3022 approaching the site. This will have a temporary negative effect on the delivery routes with the impact forecast to be slight.

On the 19 days when the abnormally sized loads will deliver the large turbine components to the site an additional 105 PCUs will travel to/from the Proposed Project. On these days it is forecast that the increase in traffic volumes will range from +1.3% on the N69 east of Foynes (Link 1) down to +0.2% on the M7, followed by +1.3% on the R494 south of Killaloe. On the west of the River Shannon the percentage differences are forecast to range from +2.3% on the R463 east of O'Briensbridge, to +7.2% on the R446 and + 31.9% on the L-3022 approaching the site. It is forecast that there will be a negative temporary, slight effect on traffic flows if the delivery of the abnormally sized loads is undertaken at night, as is proposed.

For 7 days, an additional 64 PCUs will travel to/from the Proposed Wind Farm site during the delivery of turbine components. On these days it is forecast that the increase in traffic volumes will range from +0.8% on the N69 east of Foynes down to +0.1% on the M7, followed by +0.8% on the R494 south of Killaloe. On the west of the River Shannon the percentage differences are forecast to range from +1.4% on the R463 east of O'Briensbridge, to +4.4% on the R446 and + 19.4% on the L-3022 approaching the site. This will have a temporary imperceptible negative effect on the majority of the delivery route, and temporary slight negative effect on the L-7080 leading to the Proposed Wind Farm site access.

With respect to the traffic volumes that will be generated during the construction of the Proposed Grid Connection Route connecting the proposed onsite 38kV substation to the Ardnacrusha 110kV Substation, it is estimated that there will be approximately 14 daily return trips made by a truck transporting materials, and 7 return trips made by a car to transport construction staff, to and from the Proposed Wind Farm site. The construction staff will then be transported to the location of construction on the cable route by minibus. Short term diversions are forecast for local traffic although the traffic volumes that will be impacted on the local road network are low. By its nature the effects of these additional trips and diversions on the network will be transient, will be temporary and will be slight.
Once the Proposed Development is operational the traffic impact created by maintenance staff will be imperceptible

Telecommunications and Aviation

This section of the EIAR assesses the likely significant effects of the Proposed Project on other material assets such as telecommunications and aviation assets.

This section of the assessment focuses particularly on the scoping and consultation exercise conducted with telecommunications operators and aviation authorities. Telecommunications operators and aviation authorities were contacted in May 2022 in order to determine the presence of telecommunications links either traversing or in close proximity to the Proposed Wind Farm. Scoping was carried out in line with the EPA guidelines, and the '*Best Practice Guidelines for the Irish Wind Energy Industry'* (Irish Wind Energy Association, 2012), which provides a recommended list of telecommunications operators for consultation. In addition to this, consultation was also carried out with Commission for Communications Regulation (ComReg) in order to identify any other additional licensed operators in the vicinity of the Proposed Wind Farm to be contacted, who may not have been on the list of main operators.

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

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.

Wind turbines have the potential to affect other signal types used for communication and navigational systems, for example tower-to-tower microwave communication links, and airborne and ground radar systems. Interference with radar systems occurs when wind turbines are located close to an airport or directly in line with the instrument landing approach. The closest operational large international airport is Shannon Airport in County Clare located approx. 27.5km southwest of the Proposed Wind Farm and the nearest operational airfield is Erinagh Airfield in County Tipperary which is located approx. 26.9km east of the Proposed Wind Farm.

Both Shannon Airport and the Erinagh Airfield listed above are outside the range at which such issues would be expected.

In December 2022, a scoping response was received from the IAA. They noted the IAA is not involved in the planning process but the developer must inform the aerodrome operator if erecting a manmade object at least 30 days in advance if the structure will be erected in the vicinity of the aerodrome. In their scoping response, the IAA provided a list of general observations which they said would be likely to be offered during the formal planning process by the relevant Local Authority.

The requirements of the IAA include the following:

1. *Agree an aeronautical obstacle warning light scheme for the wind farm development.*
2. *Provide as-constructed coordinates in WGS84 format together with ground and tip height elevations at each wind turbine location. Horizontal extent of turbines and blade length will also be provided.*
3. *Notify the Authority of intention to commence crane operations with a minimum of 30 days prior notification of their erection.*

As noted by the IAA, the nearest operational airport is Shannon Airport located approximately 27.5km southwest of the Proposed Wind Farm, and the nearest operational airfield is Erinagh Airfield in County Tipperary which is located approx. 26.9km east of the Proposed Wind Farm. The closest operational large international airport is Shannon Airport which is located approx. 27.5km southwest of the Proposed Wind Farm. The airports and airfields listed above are therefore outside the range at which such issues would be expected, as outlined in Appendix 15-6 Aviation Review Statement. Please refer to Appendix 15-6 for further information about potential impacts to Shannon Airport Runway Outer Horizontal Surface.

During initial consultations with the MKO, the IAA raised specific concerns in relation to the safeguarding of Instrument Flight Procedures (IFPs), Instrument Landing Systems (ILS) Flight Checks, and Navigation Aids (NAVAIDs) serving Shannon Airport. In subsequent consultations, the IAA indicated that they do not anticipate that the Proposed Project will cause any issues in relation to Instrument Flight Procedures for Shannon Airport. The IAA consultation response received on December 8th, 2022, indicated that there will be no impact on the IFPs. The IAA also indicated no impacts on the NAVAIDs for Shannon Airport. Please refer to Appendix 2-1 for further information on the scoping response from the IAA.

Additionally, in line with lighting requirements requested by the IAA and noted in the IAC Position Paper, the turbines will be marked on maps, lit at night and entered into aircraft navigation databases and therefore can be avoided during flight.

The IAA also noted that the Proposed Wind Farm is within 15km of the Woodcock Hill Secondary surveillance radar, and therefore requires a radar impact study be completed as part of the EIAR. In response to the IAA's scoping reply, an Aviation Review Statement was carried out by Ai Bridges. The Aviation Review Statement provides a detailed review on the possible impacts of the Proposed Wind Farm on aviation systems in the vicinity of the Proposed Project. This Aviation Impact Statement is included as Appendix 15-6.

The Aviation Review Statement carried out by Cyrrus and Ai Bridges identifies that the Proposed Wind Farm will not have an impact on aviation in the area to any degree that may be deemed unsafe or inconvenient to users.

Other Material Assets

This section of the Material Assets chapter considers other utilities or built services in the area such as electricity supply and transmission, water, gas and underground telecommunications. This section also considers waste management during the construction, operational and decommissioning phases of the Proposed Project.

In order to assess the potential for significant effects on built services and waste management in the vicinity of the Proposed Project, scoping requests were made to EirGrid, Irish Water and numerous departments of Clare County Council including Operations, Heritage and Environment. Refer to Section 2.7 of Chapter 2 of this EIAR for details in relation to the EIA scoping exercise.

A scoping response was received from Clare County Council (heritage, environment and planning departments); however, it did not provide details in relation to other utilities or built services within the EIAR Site Boundary.

No response was received from EirGrid or Irish Water.

Following the response from the above mentioned scoping response best practice measures will be put in place to ensure that any utilities or built services in the area will not be negatively effected by the Proposed Project during construction, operational and decommissioning phases. Mitigation measures to be put in place are detailed in Section 15.3.4.

1.16 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 Project as detailed in Chapter 4 to risks of major accidents and/or natural disasters, as well as the potential of the Proposed Project 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 Project and consequently have potential impacts on the environment. These include accidents during construction and operation 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 Environmental Protection Agency 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 Project and causing environmental damage.

As outlined in Section 16.4.1 of Chapter 16, the scenario with the highest risk score in terms of the occurrence of major accident and/or disaster during construction, operation and decommissioning was identified as 'Fire/ explosion' and 'Contamination'.

The Proposed Project will be designed and built in line with current best practice and, as such, mitigation against the risk of major accidents and/or disasters will be embedded through the design. In accordance with the provision of the European Commission '*Guidance on the preparation of Environmental Impact Assessment Reports'*, a Risk Management Plan will be prepared and implemented on site to ensure an effective response to disasters or the risk of accidents. The plan will include sufficient preparedness and emergency planning measures.

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

It is considered that when the above mitigation is implemented, and all mitigation detailed in the EIAR is implemented, there will not be significant residual effect(s) associated with the construction, operation and decommissioning of the Proposed Project

1.17 Interactions

The preceding Chapters 5 to 16 of this EIAR identify the potential significant environmental effects that may occur in terms of Population and Human Health, Biodiversity (Flora and Fauna), Ornithology (Birds), Land, Soils and Geology, Water (Hydrology and Hydrogeology), Air Quality, Climate, Noise and Vibration, Cultural Heritage (Archaeological, Architectural and Cultural Heritage), Landscape and Visual, Material Assets (Roads and Traffic, Telecommunications, Aviation, Utilities and Waste Management), and Major Accidents and Natural Disasters as a result of the Proposed Project, as described in Chapter 4 of this EIAR. All of the potential significant effects of the Proposed Project 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 Project 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.

The potential for interaction of effects has been assessed, throughout this EIAR, as part of the Impact Assessment process. While the work on all parts of the EIAR were not carried out by MKO, the entire project and all the work of the sub-consultants was managed and co-ordinated by the company. The EIAR was edited and collated by MKO as an integrated report of findings from the impact assessment process, by all relevant experts, and effects that potentially interact have been assessed in detail in the individual chapters of the EIAR and summarised in Section 17.2 of Chapter 17 of this EIAR.

Where any potential negative effects have been identified during the assessment process, these impacts have been avoided or reduced by design and the proposed mitigations measures, as presented throughout the EIAR.