

NON-TECHNICAL SUMMARY

1.

Introduction

1.1

This Environmental Impact Assessment Report (EIAR) has been prepared by MKO on behalf of Carrig Renewable Energy Ltd, who intends to apply to Tipperary County Council and Offaly County Council for planning permission to construct a renewable energy development which will comprise 7 No. wind turbines, and associated infrastructure in the townland of Cloncorrig, and adjacent townlands, in Co. Tipperary, and a 38kV on-site substation and associated works, including underground 38kV cabling to connect to the national grid at Dallow 110kV substation, in the townland of Clondallow, near Birr, Co. Offaly.

The majority of the proposed development including the 7 no. turbines and associated infrastructure, on-site substation and 10.4 kilometres (km) of the underground grid connection cabling route is located in Co. Tipperary and will be the subject of an application for planning permission to Tipperary County Council. The remaining 3.3km of the grid connection cabling route is located in Co. Offaly and will be the subject of an application for planning permission to Offaly County Council.

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

The EIAR complies with the EIA Directive of 2011/92/EU. The Environmental Impact Assessment (EIA) of the Proposed Development will be undertaken by Tipperary County Council and Offaly County Council, as the competent authorities.

Applicant

The applicant for the Proposed Development, Carrig Renewable Energy Ltd, is a subsidiary of Atlantic Infrastructure Renewables Ltd. (AIR), which is an Irish-owned, Limerick-based company. Brief Description of the Proposed Development.

The Proposed Development will comprise the construction of 7 No. wind turbines with a maximum blade tip height of up to 185 metres and all associated works and a 38 kV substation and associated works, including underground 38kV cabling to connect to the national grid at Dallow 110kV substation. The full description of the Proposed Development is detailed in Chapter 4 of this EIAR.

The project description for the Proposed Development planning application as appears in the public notice is as follows:

1. *The construction of 7 no. wind turbines and associated hardstand areas with the following parameters (all within Co. Tipperary):*
 - a. *Total tip height range of 179.5m – 185m;*
 - b. *Rotor diameter range of 149m – 163m*
 - c. *Hub height range of 103.5 to 110.5m*
2. *1 no. permanent 38kV electrical substation which will be constructed in the townland of Faddan Beg, Co. Tipperary. The proposed electrical substation consists of a single storey control building with welfare facilities, all associated plant and equipment, battery energy storage system, security fencing, all associated underground cabling, wastewater holding tank and all ancillary works and equipment;*
3. *All works (within Co. Tipperary and Co. Offaly) associated with the connection of the proposed wind farm to the national electricity grid, via the provision of underground electrical cabling (38kV) to the existing Dallow 110kV substation in the townland of Clondallow, Co. Offaly;*

4. *Provision of 14 no. joint bays, communication chambers and earth sheath links along the underground electrical cabling route (within Co. Tipperary and Co. Offaly);*
5. *Reinstatement of the road or track surface above the proposed cabling trench along existing roads and tracks;*
6. *All associated underground electrical and communications cabling connecting the turbines to the proposed wind farm substation (within Co. Tipperary);*
7. *1 no. meteorological mast with a height of 107m above ground and associated foundation and hard-standing area (within Co. Tipperary);*
8. *Upgrade of existing tracks and roads and the provision of new site access roads (within Co. Tipperary);*
9. *All works associated with the provision of a new permanent site entrance off the L5040 local road (within Co. Tipperary);*
10. *Provision of 5 no. new access and egress points along the L5041 local road in the townlands of Cloncorrig, Faddan More and Coolderry (within Co. Tipperary);*
11. *Provision of 4 no. peat repository areas and 3 no. spoil repository areas (within Co. Tipperary);*
12. *2 no. temporary construction compounds with temporary site offices and staff facilities (within Co. Tipperary);*
13. *Accommodation works along the public road network along the N52 national secondary road in the townland of Ballyloughnane to facilitate the delivery of turbine components and other abnormal sized loads (within Co. Tipperary);*
14. *Site Drainage;*
15. *Tree Felling (within Co. Tipperary);*
16. *Operational stage site signage; and,*
17. *All associated site development works, ancillary works and apparatus*

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

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

Modern wind turbine generators currently have a typical generating capacity in the 5 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 Development will have an output of 6.2MW. Therefore, on this basis, the proposed 7 no. wind turbines would have a combined generating capacity of 43.4MW. The actual turbine procured as part of a competitive tender process may have a power output that is marginally lower or greater than the 6.2MW turbine described in the EIAR. Irrespective of the power output of the actual turbine procured, the conclusions of the EIAR will not be materially affected.

Need for the Proposed Development

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

of this EIAR.

The Proposed Development provides the opportunity to capture an additional part of County Tipperary's valuable renewable energy resource. If the Proposed Development were not to proceed, this opportunity 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.

Economic Benefits

The Proposed Development 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 Development will be provided to Tipperary County Council each year and to Offaly County Council during the construction phase, which will be redirected to the provision of public services within Co. Tipperary and Co. Offaly. These services include provisions such as road upkeep, fire services, environmental protection, street lighting, footpath maintenance etc. along with other community and cultural support initiatives.

It is estimated that the Proposed Development has the potential to create up to 70 jobs during the construction phase and 3-4 jobs during operational and maintenance phases of the Proposed Development. 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.

Should the Proposed Development 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 installed capacity and/or energy produced at the site and will support and facilitate projects and initiatives including youth, sport and community facilities, schools, educational and training initiatives, and wider amenity, heritage, and environmental projects.

Purpose and Structure of this EIAR

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

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

1. Introduction
2. Background to the Proposed Development
3. Considerations of Reasonable Alternatives
4. Description of the Proposed Development
5. Population and Human Health
6. Biodiversity (excluding Birds)
7. Birds
8. Land, Soils and Geology
9. Water
10. Air
11. Climate
12. Noise and Vibration
13. Landscape and Visual
14. Cultural Heritage
15. Material Assets (including Traffic and Transport, Telecommunications and Aviation)
16. Interactions of the Foregoing
17. Major Accidents and Natural Disasters
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.

Background to the Proposed Development

This Chapter of the EIAR sets out the energy and climate change related policy and targets along with the strategic, national, regional, and local planning policies relevant to the Proposed Development. It also summarises the EIA scoping undertaken and the cumulative impact assessment process that was undertaken.

Renewable energy policy and targets

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 the Proposed Development to assist Ireland in meeting its national targets and European commitments in relation to climate change and decarbonisation.

The Proposed Development comprises 7 no. wind turbines with an estimated generating capacity of 43.4MW (assuming a rated output of 6.2MW per turbine). 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. The Climate Action Plan (CAP) published by the Government in 2023 sets out the detail for taking action to achieve a 51% reduction in overall greenhouse gas emissions by 2030, and to reach net-zero emissions by no later than 2050. 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 from those outlined in the CAP 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 changes are achieved. 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. 70% of energy used in Ireland is imported from abroad, higher than the EU average of almost 60% (National Energy Security Framework 2022). 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

The site of the Proposed Development is located in the administrative area of both Tipperary and Offaly County Council. As such, the Tipperary County Development Plan 2022 – 2028 (TCDP) and the Offaly County Development Plan 2021 – 2027 (OCDF) are the relevant statutory development plans against which the proposed development will be assessed.

Tipperary County Development Plan 2022 – 2028

The TCDP came into effect on the 22nd of August 2022. The TCDP incorporates the aims, objectives, policies and guidelines to provide for the proper planning and sustainable development of County Tipperary. The TCDP supports and facilitates developments that produce energy from renewable sources, including wind, subject to compliance with environmental and planning criteria. The TCDP has set a target of 600MW of wind energy to be constructed and operational by 2028.

The Tipperary Renewable Energy Strategy (RES), published in 2016, is incorporated into the TCDP as appendix 2 of volume 3. The RES includes a Wind Energy Strategy where areas of the county are identified as being 'Open for Consideration' and where wind energy developments are considered 'Unsuitable'. The Proposed Development site is located in an area zoned 'unsuitable for new wind energy development'. The TCDP states that in certain circumstances, Tipperary County Council may consider wind energy proposals in areas deemed to be 'unsuitable for new wind energy development' on a case-by-case. While the local policy that applies to the site as set out in the RES is unfavourable to new wind energy development, the assessments carried out as part of the EIAR demonstrate that the site is capable of accommodating the Proposed Development without significant negative effects. The Planning

Rationale Report, provided under a separate cover, sets out the rationale for the selection of the site and the design of the Proposed Development in further detail.

Offaly County Development Plan 2021 – 2027

The OCDP was adopted on 10th September 2021 and came into effect 20th October 2021. As the proposed wind turbines will be facilitated by an underground grid connection cable and a connection to the national electricity grid in the functional area of Co. Offaly, it is relevant to consider the CDP policies and objectives in relating to electricity transmission infrastructure. Within the OCDP, there is clear support for wind energy development and associated infrastructure at a local level and a commitment to shift to a low carbon economy and away from using fossil fuels. It is the council's policy to support the transmission and distribution of renewable electricity, as well as facilitating trans-boundary networks into and through the county.

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) 'the Guidelines' have been taken into account during the preparation of this EIAR.

The aim of these guidelines is to assist the proper planning of wind power projects in appropriate locations around Ireland. The Guidelines highlight general considerations in the assessment of all planning applications for wind energy. They set out advice to planning authorities on planning for wind energy through the development plan process and in determining applications for planning permission. They contain guidelines to ensure consistency of approach throughout the country in the identification of suitable locations for wind energy development. Each wind project has its own characteristics and defining features, and it is therefore impossible to write specifications for universal use. Guidelines should be applied practically and do not replace existing national energy, environmental and planning policy. While the Guidelines remain the relevant guidelines in place at the time of lodgement, and decision makers (Planning Authorities and An Bord Pleanála) 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.

Planning History

The Chapter presents an overview of the planning history of the Proposed Development site, along with other wind energy developments in the vicinity of the Proposed Development site.

A planning search was carried out through Tipperary & Offaly County Council's online planning portal in September 2023 for relevant planning applications within the red line planning application site boundaries. One extant permission was identified in the application boundary in County Offaly with nine valid planning applications identified in total within the application boundaries.

Scoping and Consultation

The Chapter presents detail of the EIA Scoping undertaken with regards the Proposed Development. A scoping report, providing details of the Proposed Development, was prepared by MKO and circulated in September 2022. In May 2023, another letter was sent informing the relevant bodies of a revision to the EIA Scoping Document for the Proposed Renewable Energy Development. 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 Section 3.2.6.1 of Chapter 3 of this EIAR, telecommunications operators were contacted in September 2022 in order to determine the presence of telecommunications links either traversing or in close proximity to the Wind Farm Site. The Chapter 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, with Appendix 2-2 of the EIAR containing a full and detailed Community Report. In summary, the report was prepared to record the consultation carried out with the local community in respect of the Proposed Development. The applicant has carried out consultation in relation

to the Proposed Development 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 Development design and EIA process.

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

Chapter 2 also includes details of the pre-planning meetings undertaken prior to the planning application being lodged, including engagement with various departments within Tipperary and Offaly County Council.

Cumulative 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, biodiversity, land, soil, water, air, climate, material assets, landscape, and cultural heritage as well as the interactions between these factors.

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

Consideration of Reasonable Alternatives

This chapter of the EIAR introduces the reasonable alternatives studied by the developer which are relevant to the Proposed Development and its specific characteristics and an indication of the main reasons for the option chosen, taking into account the environmental effects. The consideration of alternatives typically refers to alternative design, technology, location, size and scale. A 'Do Nothing Scenario' i.e., an outline of what is likely to happen to the environment should the Proposed Development not be implemented, has also be considered.

Alternative Locations

The process of identifying a suitable wind farm site is influenced by a number of factors. MKO, on behalf of the applicant's parent company (Atlantic Infrastructure Renewables – AIR), undertook a detailed screening process, through Geographical Information Spatial software (GIS), using multiple criteria and a two-phase process to identify possible sites, within numerous counties, with the potential to accommodate a wind energy development. The GIS database drew upon a wide array of key spatial datasets such as, house location data, transport, existing wind energy and grid infrastructure data, land use data and environmental data such as ecological designations, landscape designations and wind energy strategy designations available at the time.

The following is a summary of the methodology used in the screening process.

- > Phase 1 – Proximity to the National Grid
- > Phase 2 - Screening

Phase 1 – Proximity to National Grid

As part of the site selection process, it was necessary to consider the potential for grid connection, including in terms of distance to potential connection nodes and the grid capacity at the nodes, in the local area, to accommodate the connection. In this stage of the process, Mullan Grid undertook grid capacity assessments for numerous counties which focussed the site screening process to areas within close proximity to connection nodes with potential capacity.

Phase 2 – Screening

This stage in the selection process discounted lands that were not available for development under a number of criteria, as follows:

- > Residential Dwelling Locations plus 700m buffer
- > Transport corridors
- > 110kV/220kV/400kV Electricity Transmission Corridors
- > Watercourses/Waterbodies plus 50m buffer
- > Designated Sites
- > Existing wind farms developments and lands committed to permitted/proposed developments.

Results of the Screening Process

The application of the above criteria to identify a site relevant to the project and its specific characteristics, resulted in the selection of a candidate site located in north Co. Tipperary, near Carrig village. The site is now known as Carrig Renewables Wind Farm. The Screening Process also produced potential sites in Co. Kilkenny and Co. Galway, which the applicant is in the process of preparing separate planning applications for.

Suitability of the Candidate Site

Carrig Renewables Wind Farm, as a candidate site, was further examined under a number of headings in order to confirm its suitability for wind energy development.

- > Wind Speeds
- > Existing Grid Infrastructure
- > Designated Sites
- > Residential Density
- > Planning Policy

The examination confirmed that the site is suitable for wind energy development.

Summary

From the review of the criteria set out above, the Carrig Renewables Wind Farm site was identified as a suitable location for the provision of a renewable energy development of the scale proposed. The candidate site is located on agricultural land, existing commercial forestry and cutover peatland which allows the site to take advantage of existing access roads (which will be upgraded) and highlights the suitability of the candidate as it can make sustainable use of these established items of infrastructure. The candidate site is accessible in terms of connection to the national grid and is also located in an area with a relatively low population density with appropriate annual wind speeds.

Once the current candidate site emerged as a suitable location, the applicants approached the landowners in order to assemble the Proposed Development site. Arising from the site assembly discussions, the current site layout was identified and brought forward as being capable of accommodating a cohesive viable area of sufficient size to cater for the Proposed Development.

Alternative Renewable Energy Technologies

During the initial stages of the Proposed Development design, a combination of solar energy and wind energy were considered for the Proposed Development at this site, however this was subject to land availability at the time and the proposed Wind Farm Site was progressed. To achieve the same electricity output from solar energy as is expected from the proposed Wind Farm Site (c. 13.4MW), 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 315 hectares and the permanent footprint of the Proposed Development measures approximately 6 hectares, which represents approximately 1.9% of the Site. In order to achieve a c. MW output using solar PV arrays, there would be a requirement of approximately 86.8 ha, which represents approximately 27.6% of the Proposed Development site.

Alternative Turbine Numbers and Model

The proposed wind turbines will have a potential power output in the 6.2 megawatt (MW). It is proposed to install 7 no. turbines at the Wind Farm Site which could achieve approximately 43.4 MW output (mid-range capacity). Such a wind farm 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 17 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 Wind Farm Site. A larger number of smaller turbines would result in the wind farm occupying a greater footprint within the Wind Farm Site, with a larger amount of supporting infrastructure being required (i.e., roads) and increasing the potential for environmental impacts to occur.

Alternative Turbine Layout and Development Design

The design of the Proposed Development 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.

Throughout the preparation of this EIAR, the layout of the Proposed Development has been revised and refined to take account of the findings of all site investigations, which have brought the design from its first initial layout to the current proposed layout. The design process has also taken account of the recommendations and comments of the relevant statutory and non-statutory organisations, the local community and local authorities as detailed in Section 2.5 of Chapter 2

Alternative Design of Ancillary Structures

The ancillary structures for the Proposed Development include construction compounds, on-site substation, and underground electrical cabling.

Two construction compounds were deemed preferable to one single and larger compound. The compounds will be used for the storage of materials, turbine components, staff facilities and car parking. The construction compounds are located in the centre of the Proposed Development to facilitate the construction of the various infrastructure components.

The source of crushed stone for the Proposed Development will be sourced from a local, appropriately authorised quarry. Site investigation works were carried out at the Proposed Development and it was determined that there was little to no potential to develop an on-site borrow pit from which to extract rock.

Alternative Grid Connection Underground Electrical 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 Guidelines also indicate that underground cables are the preferred option for connection of a wind energy development to the national grid.

The Megawatt (MW) output of the Proposed Development is such that it can connect to either 38kV substation or a 110kV substation using a step-up transformer. The substations that were considered for connecting the Proposed Development to the national grid were:

- Birr 38kV Electricity Substation
- Derrycarney 110kV Electricity Substation
- Dallow 110kV Electricity Substation

The following options for connecting the Proposed Development to the national grid were considered:

- Option A – Underground Grid Connection to Birr 38kV Electricity Substation
- Option B – Underground Grid Connection to Derrycarney 110kV Electricity Substation
- Option C - Underground Grid Connection (off-road) to Dallow 110kV Electricity Substation
- Option D - Underground Grid Connection to Dallow 110kV Electricity Substation

Option D is the chosen grid connection option due to a number of factors that were identified in a comparison exercise carried out looking at the various options.

Option A is the shortest grid connection route of the 4 no. options listed above, however Birr 38kV Electricity Substation does not currently have the connection capacity nor is it likely to have the capacity in the future that would enable the Proposed Development to export its electricity production to the national grid.

Option B is the longest route of the listed options above and this option would have the greatest potential for significant impacts on road users. This option would also cause potential environmental nuisances for the greatest number of residential receptors. As a consequence of the length of this option and the requirement for 8 no. directional drilling locations at watercourse crossing locations, the construction costs associated with this option would be far greater than Option A or D.

Option C is the only option of the above options that is not located along the public road corridor. This option runs through agricultural land and as a result this option would have the least impact on road users. This option would require the construction of access tracks along the 13.4km route, including the construction of three new watercourse crossings. As a result, this option would give rise to a much larger development footprint and thus the greatest potential for environmental impacts. This option would travel through 31 no. landholdings and achieving option agreements with each of these individual landowners would be extremely costly and time-consuming.

Option D is located entirely within an existing infrastructure corridor and does not require the construction of any new access tracks or watercourse crossings. As a result, the potential to give rise to environmental impacts would be significantly less and this option would not require any landowner agreements. These factors resulted in Option D being chosen over Option B and C. Option D was chosen over Option A due to the lack of capacity at Birr 38kV Electricity Substation.

Alternative Port of Entry and Turbine Delivery Route

The alternatives considered for the port of entry of wind turbines into Ireland for the Proposed Development include Port of Galway, Shannon Foynes Port and Dublin Port. Shannon Foynes Port is the principal deepwater facility on the Shannon Estuary and caters for dry bulk, break bulk, liquid and project cargoes. Port of Galway and Dublin Ports also offers a roll-on roll-off procedure to facilitate import of wind turbines. All three ports and indeed others in the state, offer potential for the importing of turbine components. The primary chosen port of entry is Shannon Foynes Port due to its proximity from the port to the M7 motorway, in which the exit to the national and regional roads towards the Proposed Development is accessible.

In assessing the most suitable route for turbine transport, two options were considered for the turn from the R390 Regional Road south onto to the L5363 Local Road

- Option A: On approach from south exiting the M7 at Junction 26 Nenagh, travelling northwards utilising the N69, N18 and N52 national roads and the L5040 local road.
- Option B: On approach from southeast exiting the M7 at Junction 21 Borris in Ossory, utilizing the N52, N62 and N18, R435 and R445 regional roads and the L5040, provision of a temporary road to take the turn after the existing R390/L5363 junction via private lands

Option B is the preferred turbine delivery route option. Option A was screened out due to a vehicle turning constraint at the crossroads of the N52 - N65 - L1092 in Borrisokane that was identified in an autotrack assessment.

The Option B route has been proven suitable for the transport of turbine components, and the transport analysis (as presented in Section 14.1 of this EIAR), shows that only minor accommodation works will be required to accommodate the proposed turbines. The turbine transport route will utilise the national and primary roads available to ensure the road network holds the capacity to manage large loads.

Alternative Mitigation Measures

Mitigation by avoidance has been a key aspect of the Proposed Development's evolution through the selection and design process. Avoidance of the most ecologically sensitive areas of the site limits the potential for environmental effects. As noted above, the site layout aims to avoid 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 on the Wind Farm Site. Any forestry felled within the footprint of the Wind Farm Site will be replaced offsite, with no net loss. The alternative to this approach is to encroach on the environmentally sensitive areas of the Site and accept the potential environmental effects and risk associated with this.

The best practice design and mitigation measures set out in this EIAR will contribute to reducing any risks and have been designed to break the pathway between the site and any identified environmental receptors. 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 Development

The overall layout of the Proposed Development is shown on Figure 4-1a, this includes the Wind Farm Site and Grid Connection. The Core Site layout is shown in Figure 4-1b. Detailed site layout drawings of the Proposed Development are included in Appendix 4-1 to this EIAR.

This section of the Environmental Impact Assessment Report (EIAR) describes the Proposed Development and all its component parts. Two separate planning applications, relating to the Proposed Development, will be made to Tipperary County Council and to Offaly 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 development description for the current planning application as appears in the public notices is as follows:

The Proposed Development will consist of the provision of the following:

1. *The construction of 7 no. wind turbines and associated hardstand areas with the following parameters (all within Co. Tipperary):*
 - a. *Total tip height range of 179.5m – 185m;*
 - b. *Rotor diameter range of 149m – 163m*
 - c. *Hub height range of 103.5 to 110.5m*
2. *1 no. permanent 38kV electrical substation which will be constructed in the townland of Faddan Beg, Co. Tipperary. The proposed electrical substation consists of a single storey control building with welfare facilities, all associated plant and equipment, battery energy storage system, security fencing, all associated underground cabling, wastewater holding tank and all ancillary works and equipment;*
3. *All works (within Co. Tipperary and Co. Offaly) associated with the connection of the proposed wind farm to the national electricity grid, via the provision of underground electrical cabling (38kV) to the existing Dallow 110kV substation in the townland of Clondallow, Co. Offaly;*
4. *Provision of 14 no. joint bays, communication chambers and earth sheath links along the underground electrical cabling route (within Co. Tipperary and Co. Offaly);*
5. *Reinstatement of the road or track surface above the proposed cabling trench along existing roads and tracks;*
6. *All associated underground electrical and communications cabling connecting the turbines to the proposed wind farm substation (within Co. Tipperary);*
7. *1 no. meteorological mast with a height of 107m above ground and associated foundation and hard-standing area (within Co. Tipperary);*
8. *Upgrade of existing tracks and roads and the provision of new site access roads (within Co. Tipperary);*
9. *All works associated with the provision of a new permanent site entrance off the L5040 local road (within Co. Tipperary);*
10. *Provision of 5 no. new access and egress points along the L5041 local road in the townlands of Cloncorig, Faddan More and Coolderry (within Co. Tipperary);*
11. *Provision of 4 no. peat repository areas and 3 no. spoil repository areas (within Co. Tipperary);*
12. *2 no. temporary construction compounds with temporary site offices and staff facilities (within Co. Tipperary);*
13. *Accommodation works along the public road network along the N52 national secondary road in the townland of Ballyloughnane to facilitate the delivery of turbine components and other abnormal sized loads (within Co. Tipperary);*
14. *Site Drainage;*
15. *Tree Felling (within Co. Tipperary);*
16. *Operational stage site signage; and,*
17. *All associated site development works, ancillary works and apparatus*

The application is seeking a ten-year planning permission.

The portion of the underground grid connection cabling that is located in Co. Offaly, which will be subject to a separate planning application to that local authority, includes for approximately 3.4km of underground 38kV electrical cabling connecting the proposed on-site substation to the existing 110kV Dallow substation near Birr, Co. Offaly. All elements of the Proposed Development 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 Wind Farm Site, while maintaining sufficient distances between the proposed turbines to ensure turbulence and wake effects do not compromise turbine performance. The Grid Reference coordinates of the proposed turbine locations are listed in Table 1-1 below.

Table 4-1 Proposed Wind Turbine Locations and Elevations

Turbine	ITM Coordinates		Top of Foundation Elevation (m OD)
	Easting	Northing	
T1	599442	701335	61
T2	599430	701948	59
T3	599011	701724	58
T4	598905	701229	59.5
T5	598324	701442	61
T6	598800	702139	57.5
T7	598339	701872	59

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

- Turbine Tip Height – Maximum height 185 metres, Minimum height 179.5 metres
- Hub Height – Maximum height 110.5 metres, Minimum height 103.5 metres
- Rotor Diameter - Maximum diameter 163 metres, Minimum length 149 metres.
- Blade Length – Maximum Length 81.5 metres, Minimum Length 74.5 metres

The Proposed Development makes use of the existing road network insofar as possible. It is proposed to upgrade approximately 1.1 kilometres of existing site roads and tracks, and to construct approximately 7.4 kilometres of new access road on the Proposed Development. It is proposed to construct passing bays along the proposed access road network. Temporary construction compounds measuring approximately 4,250 square metres in area will be located in the northern section of the Wind Farm Site, adjacent to the proposed new road junction at Turbine No. 3.

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

Each turbine will be connected to the on-site electricity substation via underground 33 kV (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 approximately 1.2 metres beneath ground level, along the sides of roadways or under the roadways.

It is proposed to construct an onsite 38 kV substation within the Proposed Development and to connect from here via a 38 kV underground electrical cable connection to the existing 110 kV Dallow substation near Birr, Co. Offaly. The underground electrical cabling route originates at the proposed onsite 38kV substation within the Proposed Development and before reaching the 110kV Dallow substation property and is illustrated in Figure 4-3. The underground electrical cabling route is approximately 13.4km in length and is located entirely within the public road corridor.

The proposed onsite 38kV substation is located within forestry and will be accessed via the internal proposed road network. The footprint of the proposed onsite 38kV substation compound measures approximately 11,100 square

metres in area and will include 1 no. control building 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.

As part of the Proposed Development, tree felling will be required within and around the Proposed Development footprint to allow for the construction of the turbine bases, access roads underground cabling, and the other ancillary infrastructure. Further details on tree felling required within and around Proposed Development footprint on the Wind Farm Site is detailed in Chapter 6 of this EIAR. A small section of the Wind Farm Site is located on commercial forestry, namely Turbine no. 4 and its associated infrastructure. A total of 9.4 hectares of commercial forestry will be permanently felled within and around Turbine No. 4 and its associated infrastructure, along with existing treeline boundaries as detailed in Chapter 6. The commercial forestry felling activities required as part of the Proposed Development 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 manage any excess overburden generated through construction activities locally within the Wind Farm Site, in identified spoil management areas, and in linear berms along access roads where appropriate.

It is proposed to access the Wind Farm Site via a new site entrance off the L5040 local road to the south of the Proposed Development. This entrance will be widened to facilitate the delivery of the construction materials and turbine components. The Proposed Development entrance was subject to Autotrack assessment to identify the turning area required, as described in Section 15.1 of the Traffic and Transport Assessment.

In order to facilitate the construction of the Proposed Development, the majority of all rock and hardcore material that will be required during the construction will be sourced from a local, appropriately authorised quarries.

It is estimated that the construction phase of the Proposed Development will take approximately 12-18 months from starting on site to the commissioning of the electrical system. The construction phase can be broken down into three main phases, which overlap partially and will take approximately 12-18 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 Development is expected to have a lifespan of approximately 35 years. As part of the Proposed Development planning application, permission is being sought for a 35-year operation period commencing from the date of full operational commissioning of the Proposed Development. 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.

The wind turbines proposed as part of the Proposed Development are expected to have a lifespan of approximately 35 years. Following the end of their useful life, the equipment may be replaced with a new technology, subject to planning permission being obtained, or the Proposed Development may be decommissioned fully. The underground electrical cabling route and onsite 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.

The Proposed Development includes for an onsite 38kV electricity substation and underground grid connection cabling, connecting the Proposed Development to the national electricity grid via the existing Dallow 110kV electricity substation located in the townland of Clondallow, Co. Offaly. The cabling will be located within the public road corridor or existing tracks for its entire length. The total length of the proposed underground grid connection route is approximately 13.7km, of which 10.4km is located within Co. Tipperary and 3.3km is located within Co. Offaly.

The design, construction and operation of the wind farm will provide employment for technical consultants, contractors, and maintenance staff. Approximately, up to 70 jobs could be created during the construction, operation, and maintenance phases of the Proposed Development with most construction workers and materials sourced locally, thereby helping to sustain employment in the construction trade. This will have a Short-Term Significant Positive Impact.

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

Shadow flicker is an effect that occurs when rotating wind turbine blades cast shadows over a window in a nearby property. Shadow flicker may be experienced by an occupant sitting in an enclosed room when sunlight reaching the window is momentarily interrupted by a shadow of a wind turbine's blade. Shadow flicker effect lasts only for a short period of time and happens only in certain specific combined circumstances. Current guidelines recommend that shadow flicker at neighbouring dwellings within 10 x rotor diameter of a proposed turbine should not exceed a total of 30 hours per year or 30 minutes per day. It is further noted that at distances greater than 10 rotor diameters from a turbine, the potential for shadow flicker is very low, and therefore the shadow flicker study area is set at 1.63km (10 x rotor diameter of 163m). There are 31 no. dwellings located within the 1.63km Shadow Flicker Study Area of the Proposed Development turbines.

The potential will occur at houses located within the area surrounding the Proposed Development was calculated using the Wind Farm software package and a regional sun factor of 26.46% was applied. Of the 31 No. properties modelled; it is predicted that 16 properties may potentially experience daily shadow flicker levels in excess of the Guidelines threshold of 30 minutes per day. However, this prediction does not consider wind direction or screening provided by intervening vegetation and topography.

Where shadow flicker exceedances are experienced, suitable mitigation measures as outlined in Chapter 5 will be employed at the potentially affected properties to ensure that the Guidelines limits are not exceeded at any dwelling within the 1.63km Shadow Flicker Study Area. However, it should also be noted the Proposed Development can be brought in line with the requirements of the Draft Wind Energy Development Guidelines (December 2019) (referred to as the draft Guidelines), should they be adopted while this application is in the planning system, through the implementation of the mitigation measures outlined.

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

Following consideration of the residual effects (post-mitigation), the Proposed Development will not result in any significant effects on population and human health. Provided that the Proposed Development is constructed and operated in accordance with the design, best practice and mitigation that is described within this application, significant effects on population and human health are not anticipated at international, national or county or local scale levels in excess of the Guidelines threshold of 30 minutes per day. However, this prediction does not consider wind direction or screening provided by intervening vegetation and topography.

Where shadow flicker exceedances are experienced, suitable mitigation measures as outlined in Chapter 5 will be employed at the potentially affected properties to ensure that the Guidelines limits are not exceeded at any dwelling within the 1.63km Shadow Flicker Study Area. However, it should also

be noted the Proposed Development can be brought in line with the requirements of the Draft Wind Energy Development Guidelines (December 2019) (referred to as the draft Guidelines), should they be adopted while this application is in the planning system, through the implementation of the mitigation measures outlined.

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

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

Biodiversity

This chapter assesses the likely significant effects (both alone and cumulatively with other projects) that the Proposed Development may have on Biodiversity, Flora and Fauna, and sets out the mitigation measures proposed to avoid, reduce or offset any potential significant effects that are identified.

To inform the assessment, a comprehensive desk study and suite of field surveys have been carried out. Multidisciplinary walkover surveys were undertaken on the 10th August 2022, 8th September 2022, 10th February 2023, 13th June 2023, 29th June 2023, 12th of July 2023 and 11th August 2023. Habitat surveys of the Proposed Development site covered the recognised optimum period for vegetation surveys/habitat mapping, i.e. April to September (Smith *et al.*, 2011). Dedicated species/habitat specific surveys including for, bats, and protected mammals and detailed habitat assessment surveys were carried out, during which any incidental records of other species were also recorded. In addition, fisheries surveys and aquatic macroinvertebrate surveys have been undertaken as part of the detailed baseline assessment, the detailed results of which are provided in technical appendices to this EIAR.

The 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 and locations of ecological significance. These surveys were carried out in accordance with NRA Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes (NRA, 2009).

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

The habitats on the Proposed Development site were the subject of a detailed survey and assessment and habitat mapping. This habitat mapping and assessment was undertaken following the 'A Guide to Habitats in Ireland' (Fossitt, 2000). Cutover raised bog habitats have also been categorised to plant communities from the Irish Wildlife Manual No. 128 - The habitats of cutover raised bog (Smith & Crowley 2020), and woodland communities have been categorised to communities from the National Survey of Native Woodlands (Perrin *et al.* 2008). Plant communities have also been categorised according to the Irish Vegetation Classification system.

The Proposed Development site comprises large areas of dry, degraded cutover raised bog (PB4) habitats which comprise areas of bare peat and pioneering vegetation. Areas within the Proposed Development site are still subject to turbary activity. Other large areas of the Proposed Development site comprise conifer plantation (WD4). Bog woodland (WN7) is also present within the site which has been subject to assessment and was found not to conform to the Annex I habitat type. Fields of improved agricultural grassland (GA1) are also found around the periphery of the bog. A number of watercourses were identified within the site and correspond to eroding/ upland rivers (FW1). Watercourses were mainly comprised of small streams - the Faddan Beg flowing through the north of the site, and Holy Well Clohaskin flowing through the south of the site. Hedgerows (WL1) and treelines (WL2) delineate agricultural field boundaries.

The majority of the lands on either side of the road along the length of the Grid Connection underground electrical cabling route (which is restricted to the existing road) is made up of improved agricultural grassland (GA1) and wet grassland (GS4) with associated hedgerows (WL1) and Treelines (WL2), with depositing lowland rivers (FW2) and drainage ditches (FW4) crossing the underground electrical cabling route.

The construction of the Proposed Development will result in the direct loss of approximately 9.9ha of degraded cutover bog (PB4); these habitats have been assessed as being of local importance (higher value) due to their being comprised of bare peat and low *Sphagnum* cover, although providing a degree of biodiversity in a local context. These habitats do not correspond to Annex I peatland habitats. This loss of area equates to approx. 5% of the local bog complex and is not considered significant at the County scale. Approx. 5.8ha of bog woodland (WN7), 1ha of bog woodland/scrub mosaic and 1.9ha of broadleaved woodland (ash plantation) will be lost for the Proposed Development. The loss of these habitats is not considered significant at a County scale. It is proposed to replace unhealthy ash trees within the ash plantation with alternative, healthy native species in order to increase the age structure, diversity and longevity of this woodland. It is also proposed to create wildflower grassland areas on

proposed spoil repository areas within the Proposed Development site. These measures are detailed within the Biodiversity Management and Enhancement Plan (Appendix 6-4 of the EIAR).

Approximately 383m of hedgerow (WL1) and treeline (WL2) habitat will be permanently removed within and around the footprint of the Proposed Development to facilitate some elements of infrastructure and new access roads. Removal of this combined length hedgerow/treeline is also required to achieve the required buffer distance for the protection of bats, from the turbines to the canopy of the nearest habitat feature, as recommended by the Natural England (2014) and NatureScot (2021). It is proposed to plant 674m of new hedgerow to offset this potential loss and to provide additional habitat connectivity within the Proposed Development site. Overall, the proposed replanting will result in a net gain of approximately 291m in the linear landscape features within the Proposed Development site.

Bat species composition and abundance was found during detailed bat surveys undertaken at the Proposed Development site to be typical of the geographic location and the largely open nature of the Proposed Development site. Bats as an Ecological Receptor have been assigned Local Importance (Higher value) on the basis that the habitats within the study area are utilized by a regularly occurring bat population of Local Importance. Following the implementation of mitigation, no potential for residual significant effects with regard to loss of commuting and foraging habitat, loss or damage to roosts, displacement or other construction phase impacts have been identified; the proposed net gain in linear landscape features within the site will result in a long-term positive impact on bats at the local level. In relation to potential collision risk and injury with operational turbines, a bespoke adaptive monitoring and mitigation strategy has been devised for the Proposed Development in line with NatureScot (2021) Guidance, which will ensure that there is no potential for significant residual effects on local bat populations during the operational phase of the Proposed Development.

No otter signs were recorded along watercourses within the site or in close proximity to the main windfarm infrastructure (turbines, access roads etc). The fisheries potential of the watercourses within the site boundary is poor and therefore otter are more likely to utilise the lower reaches of the watercourses, downstream of the Proposed Development site. Otter signs in the form of spraints and prints were recorded at sites on the Holy Well Clohaskin River and Little Brosna River downstream of the Proposed Development site. No otter holts or other resting places were recorded during any of the ecological surveys. There is no potential for direct loss or fragmentation of significant otter habitat including loss of breeding or resting places. Given that no otter holts or resting places were recorded within the Proposed Development site, no direct mortality, significant disturbance or any barrier to the movement of otter is anticipated. From a precautionary perspective, a pre-commencement otter survey will be undertaken in accordance with standard best practice guidance prior to the commencement of site works. In the unlikely event that an otter holt is identified within or immediately adjacent to the Proposed Development footprint, consultation will be undertaken with the National Parks and Wildlife Service and any additional mitigation required would be implemented, under a derogation licence where required.

A badger sett was identified in proximity to a proposed road upgrade within the Proposed Development site. In order to prevent disturbance or habitat loss to badgers within the site, it is proposed to install an artificial sett in suitable, similar habitat in proximity to the existing sett. It is proposed to then exclude the existing sett in advance of works in accordance with NRA guidelines. These measures are fully detailed within the EIAR and the Biodiversity Management and Enhancement Plan (Appendix 6-4 to the EIAR). The artificial sett will be monitored to ensure its use by the badgers. In addition, pre-commencement surveys for badger will be carried out. With these measures in place, there is no potential for significant impact to badger via habitat loss or disturbance.

Common Frog and Smooth Newt were recorded within the site and as such mitigation is in place, including pre-commencement surveys of suitable habitats, to prevent impacts to these species.

No signs of any additional protected fauna were recorded within the Proposed Development site during the survey work undertaken.

No residual significant effects on surface water quality, groundwater quality or the hydrological/ hydrogeological regime were identified during construction, operation, or decommissioning. No significant effects as a result of groundwater pathways or drainage of adjacent peatland habitats and protected raised bog sites have been identified. A full hydrological assessment in relation to the Proposed Development has been carried out in Chapter 9 of the EIAR.

In relation to designated sites, the following Nationally designated sites have been identified as being within the Likely Zone of Impact and have been assessed in the EIAR:

- > Arragh More Bog NHA [000640]
- > Killeen Bog NHA [000648]
- > River Little Brosna Callows NHA [000564]
- > Ballyduff/Clonfinane Bog [000641]
- > Kilcarren-Firville Bog [000647]
- > Dovegrove Callows [000010]
- > Birr (Domestic Dwelling No.1, Occupied) [000569]
- > Birr (Domestic Dwelling No. 2, Occupied) [000568]
- > Bracken's Dwelling, Near Whiteford [002058]
- > River Shannon Callows [000216]
- > Lough Derg [000011]
- > Banagher (Domestic Dwelling, Occupied) [000567]
- > Cloghanbeg [002059]
- > Miltown, Shinrone [002065]
- > Kinnitty (Domestic Dwelling, Occupied) [000579]
- > St. Joseph's, Mountheaton [002063]
- > Drumakeenan National School [002064]

A number of these sites are also designated as European designated sites including the following:

- > Ballyduff/Clonfinane Bog SAC [000641]
- > Arragh More (Derrybreen) Bog SAC [002207]
- > Kilcarren-Firville Bog SAC [000647]
- > Lough Derg, North-east Shore SAC [002241]
- > River Shannon Callows SAC [000216]
- > Dovegrove Callows SPA [004137]
- > River Little Brosna Callows SPA [004086]
- > Middle Shannon Callows SPA [004096]
- > Lough Derg (Shannon) SPA [004058]

These European Sites (SACs and SPAs) have been fully assessed under those designations within the Appropriate Assessment Screening and Natura Impact Statement (NIS) that accompanies this EIAR. This report has been prepared to provide the competent authorities with the information necessary to complete an Appropriate Assessment screening and an Appropriate Assessment for the Proposed Development in compliance with Article 6(3) of the Habitats Directive. The NIS concludes that the Proposed Development, individually or in-combination with other plans or projects, will not adversely affect the integrity of any European Site.

It is therefore judged that, provided that the Proposed Development is constructed and operated in accordance with the design, best practice and mitigation that is described within this application, significant residual impacts on biodiversity, flora and fauna at the County scale will not occur.

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Birds

This chapter assesses the likely significant effects that the Proposed Development may have on bird species. Firstly, a brief description of the Proposed Development is provided. This is followed by a comprehensive description of the methodologies that were followed in order to obtain the information necessary to complete a thorough assessment of the potential effects of the Proposed Development on bird species. The survey data is presented in full in the 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 Development are then described in terms of the construction, operation and decommissioning phases of the Proposed Development. An accurate prediction of the effects is derived following a thorough understanding of the nature of the Proposed Development along with a comprehensive knowledge of bird activity within the Wind Farm Site. The identification of Key Ornithological Receptors (KORs) and the assessment of effects follow a precautionary approach.

The potential for effects on designated sites is fully described in the Natura Impact Statement (NIS) that accompanies this application. The NIS concluded that where the potential for any adverse effect on any European Site has been identified, the pathway by which any such effect may occur has been robustly blocked through the use of avoidance, appropriate design and mitigation measures as set out within this report and its appendices. The measures ensure that the construction, operation and decommissioning of the Proposed Development will not adversely affect the integrity of any European sites.

Based on the detailed assessment, it is considered that the potential effects of the Proposed Development upon birds will not be significant. Effects associated with habitat loss, disturbance/displacement, collision risk and cumulative effects have been assessed to be no greater than long-term slight negative effect (EPA, 2022) and low effect significance (Percival, 2003). In conclusion, following consideration of the residual effects (post-mitigation), it is concluded that the Proposed Development will not result in any significant effects on any identified KORs. No significant effects on receptors of International, National or County Importance were identified. Provided that the Proposed Development is constructed, operated and decommissioned in accordance with the design and best practice mitigation measures that are described within this application, significant individual or cumulative effects on the identified KORs are not anticipated.

Land, Soils and Geology

The geology of the site predominately comprises raised bog (peat) overlying glacial subsoil deposits which in turn are underlain by limestone bedrock. Trial pit investigations were undertaken to investigate the subsoil conditions below the peat. Peat depths were determined by probing.

Measured peat depths range from 0 - 4.49m across the wind farm site, with an average depth of 1.6m recorded. Approximately 32% (49 no.) of the peat depths were less than 0.5m while 81% (126 no.) were less than 2m. Overall the peat depths would be considered shallow for basin peat.

Peat depths at the turbine locations ranged between 0.6 (T4) and 3.7m (T2) with an average peat depth of 2.3m. CLAY or SILT dominated glacial tills are present below the peat.

Construction of the wind farm infrastructure will require the removal of peat, soil and rock to competent foundation. Local quarries will provide material for access road, turbine bases and general hard-standing construction. Removal of soil, peat and bedrock represents a permanent direct impact on the geology of the site which is considered to be an acceptable part of economic progression and development.

During the construction phase sources of contaminants (such as oil based substances or other hazardous chemicals) will not be stored at the site except where this is done within safely bunded areas that safely contain all spillages and prevent the migration of contaminants into soil, peat and bedrock. Refuelling will be done with a double skinned bowser with spill kits on the ready in case of accidental spillages. The risk is considered to be low once mitigation measures are implemented.

The peat stability assessment undertaken at the site shows that the site has an acceptable margin of safety for the proposed development. A number of control measures are given in the peat stability assessment to manage all risks associated with peat instability.

A Peat Management Plan has been prepared for the development which details management of peat during construction works and long term storage thereafter. Peat removed during the excavation works will be deposited in the proposed spoil and peat repositories.

The potential residual impacts associated with soil or ground contamination and subsequent health effects are imperceptible.

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

The geological impact assessment undertaken in this chapter outlines that significant effects will not occur due to the localised nature of the construction works and therefore there is no potential for cumulative effects.

Water

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

Regionally, the proposed Carrig wind farm site is located in the Little Brosna River surface water catchment. The proposed site drains to the south towards the Little Brosna River via 2 no. streams: the Feddan Beg stream in the east and the Holy Well Clohaskin stream in the west. All surface water drainage pathways from the proposed Carrig wind farm site eventually discharge to the Little Brosna 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 site during the construction and operational phases of the development and measures are proposed within the EIAR to deal with these potential minor local impacts.

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

Surface water drainage measures, pollution control and other preventative measures have been incorporated into the project design to minimise significant impacts on water quality and downstream designated sites. A self-imposed 50m stream and lake buffer was used during the design of the Proposed Development, thereby avoiding sensitive hydrological features. The surface water drainage plan will be the principal means of significantly reducing sediment runoff arising from construction activities and to control runoff rates. The key surface water control measure is that there will be no direct discharge of wind farm runoff into local watercourses or into the existing bog 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 Development provided the proposed mitigation measures are implemented. This EIAR presents proven and effective mitigation measures to mitigate the release of sediment which will reduce the concentration of suspended solids to acceptable levels. The storage and handling of hydrocarbons/chemicals will be carried out using best practice methods which will ensure the protection of surface and groundwater quality. The Proposed Development drainage system will be designed to slow surface water runoff from the proposed site by providing greater attenuation. This will ensure that the Proposed Development does not alter downstream surface water flows and will not contribute to downstream flooding.

A hydrological assessment of potential impacts on local designated sites was undertaken. The Dovegrove Callows SPA and pNHA, the Little Brosna Callow SPA and NHA and the River Shannon Callows SAC are considered to be hydrologically connected to the wind farm site via the Little Brosna River and its tributaries. Following implementation of the appropriate mitigation measures as outlined in the EIAR no significant impacts on this designated site will occur as a result of the Proposed Development.

A Water Framework Directive (WFD) Compliance Assessment has been completed for all waterbodies (surface water and groundwater bodies) with the potential to be impacted by the Proposed Development. With the implementation of the mitigation measures detailed in this EIAR there will be no change in the WFD status of the underlying groundwater body or downstream surface waterbodies as a result of the Proposed Development. The Proposed Development has been found to be fully compliant with the WFD and will not prevent any waterbody from achieving its WFD objectives.

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

This chapter assesses the likely significant effects that the Proposed Development may have on hydrology and hydrogeology and sets out the mitigation measures proposed to avoid, reduce or offset any potential significant effects that are identified. Regionally, the proposed Carrig wind farm site is located in the Little Brosna River surface water catchment. The proposed site drains to the south towards the Little Brosna River via 2 no. streams: the Feddan Beg stream in the east and the Holy Well Clohaskin stream in the west. All surface water drainage pathways from the proposed Carrig wind farm site eventually discharge to the Little Brosna 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 site during the construction and operational phases of the development and measures are proposed within the EIAR to deal with these potential minor local impacts.

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

Surface water drainage measures, pollution control and other preventative measures have been incorporated into the project design to minimise significant impacts on water quality and downstream designated sites. A self-imposed 50m stream and lake buffer was used during the design of the Proposed Development, thereby avoiding sensitive hydrological features. The surface water drainage plan will be the principal means of significantly reducing sediment runoff arising from construction activities and to control runoff rates. The key surface water control measure is that there will be no direct discharge of wind farm runoff into local watercourses or into the existing bog 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 Development provided the proposed mitigation measures are implemented. This EIAR presents proven and effective mitigation measures to mitigate the release of sediment which will reduce the concentration of suspended solids to acceptable levels. The storage and handling of hydrocarbons/chemicals will be carried out using best practice methods which will ensure the protection of surface and groundwater quality. The Proposed Development drainage system will be designed to slow surface water runoff from the proposed site by providing greater attenuation. This will ensure that the Proposed Development does not alter downstream surface water flows and will not contribute to downstream flooding.

A hydrological assessment of potential impacts on local designated sites was undertaken. The Dovegrove Callows SPA and pNHA, the Little Brosna Callow SPA and NHA and the River Shannon Callows SAC are considered to be hydrologically connected to the wind farm site via the Little Brosna River and its tributaries. Following implementation of the appropriate mitigation measures as outlined in the EIAR no significant impacts on this designated site will occur as a result of the Proposed Development.

A Water Framework Directive (WFD) Compliance Assessment has been completed for all waterbodies (surface water and groundwater bodies) with the potential to be impacted by the Proposed Development. With the implementation of the mitigation measures detailed in this EIAR there will be no change in the WFD status of the underlying groundwater body or downstream surface waterbodies as a result of the Proposed Development. The Proposed Development has been found to be fully compliant with the WFD and will not prevent any waterbody from achieving its WFD objectives.



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

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Air

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 Development.

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

- > Zone A: Dublin City and environs
- > Zone B: Cork City and environs
- > Zone C: 16 urban areas with population greater than 15,000
- > Zone D: Remainder of the country.

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

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

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

A Construction and Environmental Management Plan (CEMP) will be in place throughout the construction phase (see Appendix 4-2 of the EIAR) and includes dust suppression measures. In addition, turbines and construction materials will be transported to the site on specified transport routes only. The agreed transport route roads adjacent to the Proposed Development site will be regularly inspected for cleanliness and cleaned as necessary.

Climate Change and Carbon Balance Calculations

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

In June 2022, the Environment Protection Agency released 'Ireland's Greenhouse Gas Emissions Projections 2020-2040'. The EPA projections show that currently implemented measures (With Existing Measures) will achieve a reduction of 5% on 2005 levels by 2030, significantly short of the 30% reduction target. If measures in the higher ambition (With Additional Measures) scenario are implemented, the 30% reduction target by 2030 can be achieved. In the With Additional Measures scenario, it is assumed that by 2030 renewable energy generation increases to approximately 80% of electricity consumption. However, increased coal use from 2021 and growing energy demand, including from data centres, threaten to negatively impact preferred scenario.

The Proposed Development will have an export capacity of approximately 43.4MW and therefore will help contribute towards this target. As well as this, it will provide much needed grid infrastructure and the capacity to offset 1,417,934 tonnes of carbon dioxide over its operational lifetime thereby reducing the Greenhouse Gas effect and improving air quality as we transition to cleaner energy industries. Please see Section 10.2.4 for details on Carbon offset calculations.

A methodology for calculation carbon losses was published in June 2008 by scientists at the University of Aberdeen and the Macaulay Institute with support from the Rural and Environment Research and Analysis Directorate of the Scottish Government, Science Policy and Co-ordination Division. 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. 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 peat removal, drainage and operation of wind farm. The model calculates the total carbon emissions associated with the proposed wind farm development including manufacturing of the turbine technology, transport, construction of the development and carbon losses due to peatland disturbance. The model also calculates the carbon savings associated with the proposed wind farm development. Previously guidance produced by Scottish Natural Heritage in 2003 had been widely employed to determine carbon payback in the absence of any more detailed methods.

Given the absence of peat underlying the Wind Farm Site, the Proposed Development will not give rise to any impact on peat habitat. The Macaulay Institute methodology states that the total volume of peat impacted by the construction of a wind farm is strongly correlated to the extent of the peatland affected by drainage at a site. Therefore, in calculating the carbon loss/saving of the Proposed Development, all potential carbon losses associated with constructing a wind farm on peatland environments were discounted, but the carbon losses as a result of the manufacture, transportation and erection of the proposed turbines was included in the calculation, including as a result of the removal of vegetation.

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

1.12 **Noise and Vibration**

A noise assessment was undertaken to determine the likely significant noise and vibration effects from the construction and operational phases of the Proposed Development.

Predicted construction noise levels at the nearest noise sensitive receptors during all phases of construction are below the threshold values within BS 5228 and are therefore 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.

For the operational noise assessment, a background noise survey was undertaken at five noise monitoring locations. The data was analysed in conjunction with on-site measured wind speed data and operational noise limits have been derived in accordance with the WEDG 2006.

The operational noise assessment was undertaken in three stages, which involved setting the Total WEDG Noise Limits (which are limits for noise from all wind farms in the area) at the nearest noise sensitive receptors, predicting the likely effects (undertaking cumulative noise predictions) and finally setting Site Specific Noise Limits for the operation of the Proposed Development on its own.

Predicted cumulative operational noise levels from the Proposed Development (assuming a Vestas 162 as a candidate turbine) and two nearby operational wind farms indicate that for noise sensitive neighbouring receptors, the Total WEDG Noise Limits would be met at all receptors. Two hub heights at 105 m and 110.5 m have been predicted to illustrate the noise level differences for the proposed turbine dimension range, and the assessment shows that the differences are marginal, within 0.1 dB. In accordance with the guidance in IOA GPG and worst-case assumptions, Site Specific Noise Limits have been derived with due regard to cumulative noise by accounting for the proportion of the Total WEDG Noise Limit which is potentially being used by other nearby developments. Predicted operational noise levels from the Proposed Development on its own with the candidate turbine indicate that Site Specific Noise Limits would be met, albeit with minor requirements for noise management for the two nearest turbines to NAL9, for certain wind speeds and wind directions (7m/s and westerlies) in daytime only. The effects are therefore deemed to be not significant.

A Site Specific Noise Limit was also calculated using worst-case assumptions and the assessment has shown that the Proposed Development operating on its own with the candidate turbine assessed in this report would meet that limit,

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

The wind turbine model was chosen in order to allow a representative assessment of the noise impacts. Should the Proposed Development receive consent, 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 Site Specific Noise Limits presented in the noise assessment.

Archaeology and 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 Development. The assessment was based on desktop research, field surveys, GIS based mapping, ZTV and was also assisted by photowire images from certain assets. 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 and a windscreen survey of the proposed underground electrical cabling route and pinchpoints along the proposed TDR. Two recorded monuments are located within the proposed Wind Farm Site, however, they are not located in the footprint of any proposed infrastructure. Mitigation measures are recommended in order to prevent any accidental damage to these monuments.

Where potential impacts have been identified, such as to potential sub-surface archaeology, appropriate mitigation measures have been recommended in order to minimise any such impacts. Recommended mitigation includes pre-development archaeological testing of the proposed wind farm infrastructure (turbine bases, hardstands, compounds, new roads, etc) and archaeological monitoring during the construction stage of the project.

Potential indirect effects on the setting of any UNESCO World Heritage Sites and those on a Tentative List within 20km, National Monuments within 10km, recorded monuments within 5km and RPS/NIAH structures within 5km were included in order to assess potential effects on setting in the wider landscape. No UNESCO WHS or those on a Tentative List are located within 20km of the nearest proposed turbine. The ZTV demonstrates theoretical visibility of all seven proposed turbines from the majority of cultural heritage assets within 5km and from some National Monuments within 10km. Both the distance to the nearest turbine and the number of turbines visible from each cultural heritage asset were used to arrive a level of potential effect on setting. Potential effects on setting are based on the worst case 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 underground electrical cabling route were assessed for potential impacts to same. No direct impacts to the recorded archaeological, architectural or cultural heritage resource as a result of the proposed grid connection route have been identified. Mitigation measures are recommended where deemed appropriate and include archaeological monitoring of ground works in specified areas along the proposed route. An assessment of potential impacts as a result of pinch points along the proposed Turbine Delivery Route was also carried out. No direct or indirect impacts to the recorded archaeological or cultural heritage resource were identified. Mitigation measures have been recommended where appropriate and include archaeological monitoring of ground works at specified areas along the proposed route.

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

1.14 **Landscape and Visual**

The sensitive visual and landscape receptors with visibility of the Proposed Development were assessed based on site visits and using multiple tools and methods including the production of verified photomontages that follows best practice guidance for LVIA (see Appendix 14-1 for an overview of the methodology employed). Other tools such as ZTV mapping and Route Screening Assessment have also been employed to determine the likely potential and actual visibility of the proposal. No 'Significant' landscape or visual effects were recorded as a result of the proposed Carrig Renewables Wind Farm.

The Proposed Development is located within a flat landscape predominantly covered by flat cutover peat, agricultural land, and commercial forestry. The Proposed Development is situated to the west and northwest of topographical features such as the Slieve Bloom Mountains and Knockshigowna, respectively, within the LVIA Study Area, that provide screening.

ZTV mapping (Figure 14-1) shows that there is primarily full theoretical visibility within 5km of the proposed turbines, with an area of no theoretical visibility approximately 4.5km south-east due to the presence of a ridgeline. The ridgeline extends in a south-westerly direction to the edge of the LVIA Study Area, creating large patches of no theoretical visibility. Large areas of limited theoretical visibility are also prominent beyond 10km to the southwest, along the shores of Lough Derg. The topography to the northwest of the site creates a large area of no theoretical visibility, extending for the most part to the Shannon itself and beyond. The remaining areas within the LVIA Study Area (20km from the Proposed Development Site) have theoretical visibility with some patches of no visibility. However, on-site surveys found that most prominent visibility is located within 5km of the Proposed Development Site. Beyond 5km, intermittent views of the turbines will occur, however the turbines are mainly viewed as small elements within the background of the view at these distances.

The landscape area within which the Proposed Development is located is predominantly a working landscape of grassland, cutover peat and commercial forestry. The site is currently used primarily for agriculture, with substantial screening occurring from the presence of mature forestry present on site and the surrounding area. As a result, most locations where there are areas of high amenity, primary amenity areas and areas of scenic views and routes, with open views towards the majority of the turbines in the Proposed Development, tend not to be located in close proximity, reducing the spatial extent and size of the turbines from sensitive locations where they are likely to be viewed from.

In terms of construction and operational phase landscape effects relating to designated landscape receptors (see Section 14.7.3.1.1 and Section 14.7.3.1.2 of Chapter 14), there were no 'Significant' landscape effects deemed to arise as a result of the Proposed Development and it was determined that the addition of the Proposed Development is consistent with the sustainable development of these areas and achieves the balance sought between the policies outlined in TCDP.

In relation to County Tipperary's Primary Amenity Areas, the Lough Derg and River Shannon Primary Amenity Areas was assessed in order to determine whether the Proposed Development (Operational, Construction and Decommissioning Phase) has 'Significant' landscape effects on the visual quality of the area within this location. No 'Significant' landscape effects were found to arise. For this primary amenity area, views will be limited towards the proposed turbines due to the topographical screening from the undulating landforms and vegetation along the riverbanks and lakeshores providing substantial screening in the direction of the Proposed Development, greatly limiting views towards the proposed turbines. In addition, the view of the primary amenity area is directed towards the lakeshores, in the opposite direction of the turbines. Overall, when visible, such as on Tipperary SR51, the turbines will appear as background elements within the view.

In relation to County Offaly's Areas of High Amenity (AHA), Slieve Bloom Mountains and Other Eskers were assessed in order to determine the significance of landscape effects.

For the Slieve Bloom Mountains, the proposed turbines will be visible within a flat plain from the elevated vantage points on the foothills of the mountains. It is noted that the turbines are located at a substantial distance away from this AHA and appear as background elements absorbed within the expansive view with a limited horizontal extent. Given the separation distance from the proposed Development and the scale of the landscape in view, the setting on the

Slieve Bloom Mountains is not fundamentally altered as a result of the addition of the Proposed Development within the view.

For Other Eskers, limited theoretical visibility occurs to the eskers designated as AHAs due to a large area of no theoretical visibility created by the topography of Knockshigowna. In relation to the eskers located within the zone of theoretical visibility (7km northeast) the turbines will appear as small background elements within the view. It is emphasised that the Proposed Development is not located directly on eskers within County Offaly, and as such will not cause direct physical changes to these landscape features, a primary concern of the policy and discussion contained within the Offaly County Development Plan 2021-2027.

In terms of landscape character, the turbines are located within an LCA given a *“Dominant Sensitivity Rating”* of Class 2 – Transitional Sensitivity in the LCAT, the third lowest of six sensitivity classes assigned to LCAs within County Tipperary. The Proposed Development is located on Peat Bogs (compatibility rating 3rd highest out of 6 classes – *“likely to be compatible if sited and designed with great care.”* in the TCDP) and agricultural land (compatibility rating 2nd highest out of 6 classes – *“likely to be compatible with reasonable care.”* in the Tipperary County Development Plan 2022-2028. As discussed in Appendix 14-2, it is considered that while this LCA is given a Dominant Sensitivity Rating of Class 2, the siting of the Proposed Development primarily on land use types with good compatibility ratings in relation to wind energy development suggests that at a project level the landscape character of the Proposed Development Site is generally suitable for this type of development. Furthermore, considering the low levels of visibility of the proposed turbines from locations beyond 5km from the site, the sensitivity of the parts of this LCA where the proposed turbines will actually be seen (with these tending towards compatible land use types) is not as high as the overall rating of Class 2 – Transitional Sensitivity suggests. Furthermore, it is emphasised that the sensitivity of this LCA as outlined in the policy is still relatively low in comparison with other LCAs in the county. Incorporating all factors outlined above, including the sensitivity and land use compatibility ratings, this LCA is deemed to have a ‘Medium’ sensitivity to wind farm development. The magnitude of change is deemed to be ‘Moderate’. As set out in Appendix 14-2 a ‘Moderate’ effect on the landscape character of this LCA is likely to occur as a result of the Proposed Development.

Taking into account its current land use and remoteness, the dense vegetation and flat topography taking advantage of screening in the landscape to limit views of proposed turbines and the policy contained within the TCDP, the landscape of the Proposed Development Site itself has a Medium sensitivity to wind energy development and no ‘Significant’ landscape effects will arise as result of the Proposed Development (further detail in Section 14.7.3.1 of Chapter 14).

In terms of the wider landscape character of the LVIA Study Area (15km study area for effects on landscape character – see Section 14.2.1 of Chapter 14), there will be no ‘Significant’ landscape effects. Residual landscape effects of ‘Slight’ and ‘Not Significant’ were deemed to arise for the two LCAs located within 5km of the Proposed Development, Tipperary LCA 11 and Offaly ILCA 1, respectively, as visibility from these LCAs will be limited towards the proposed turbines as a result of screening from the high levels of vegetation existent within these LCAs. In relation to visibility in LCAs beyond 5km, there will only be views of the turbines from isolated elevated locations. From sensitive parts within each LCA (e.g. River Shannon and Lough Derg), the vegetation along the riverbanks and lakeshores provide substantial screening in the direction of the Proposed Development, greatly limiting views towards the proposed turbines.

In terms of cumulative landscape effects, the Proposed Development is located within a flat, heavily vegetated agricultural plain located between the Slieve Bloom Mountains and Lough Derg with the existing Skehanagh and Carrig wind farms located along the ridgeline approximately 4km southeast of the Proposed Development. Due to the dense vegetation, intermittent views of the existing windfarms arise. Due to this, there is a capacity to absorb further wind energy development within this landscape area without ‘Significant’ effects on landscape character. Wind energy developments do not dominate this landscape type and the addition of the Proposed Development will not substantially alter the baseline status of the landscape in this regard. Views of both proposed turbines and existing turbines in combination will be intermittent as result of the flat terrain and vegetation in the landscape. The highest cumulative landscape effects will be localised to areas within 5km of the proposed turbines where visibility will be greatest. From locations beyond this, any views of the Proposed Development will be background views where the proposed turbines occupy a limited horizontal and vertical extent within views.

It is noted that there are additional wind energy developments within the LVIA Study Area, however given the substantial distance (>12km for the Meewuan turbines which are the closest of the turbines located in County Offaly), 'Significant' effects on landscape character are not deemed to arise.

The visual assessment concluded that residual visual effects of 'Significant' was deemed to arise at two of the 18 viewpoint locations. All other viewpoints were assessed as resulting in Moderate (2), Slight (6), Not Significant (6) and Imperceptible (2) residual effects. As demonstrated in the Photomontage booklet (Volume 2) and photomontage assessment tables (Appendix 14-3), the turbine locations, spacing, and heights have been appropriately selected for the Carrig Renewables Wind Farm, and design of the Proposed Development adheres to the guidance for the siting of wind farms in Flat Peatland landscape types, as set out in the WEDGs and draft WEDGs (DoEHLG, 2006), & (DoPHLG, 2019). The siting ensures the wind farm will be viewed at a low elevation, reducing the geographical extent of visibility and visual exposure.

15 no. designated scenic routes along with a number of other sensitive visual receptors were assessed as part of this visual assessments. There were no 'Significant' effects found to occur at designated scenic routes and views within the LVIA Study Area, with the scenic routes and views deemed to have a residual effect of either 'Slight' or 'Imperceptible'.

In terms of other sensitive visual receptors, such as recreational and tourist destinations, settlements, and transport routes, the visual effects were found to be either 'Slight', 'Not Significant' or 'Imperceptible' for the majority of these. A 'Moderate' effect is deemed to arise for visual receptors in close proximity to the Proposed Development. These include the settlement of Carrig, the 'Ormond Way' recreational route, and the N52 national road.

In relation to residential receptors in close proximity to the site, a physical landscape buffer is formed by the field structure, vegetation, and other landscape elements, providing a sense of scale in relation to the setback distance of the turbines. Due to the iterative design process, the turbines are viewed behind the mature forestry seen within a moderate horizontal extent, even in locations in close proximity to the proposed turbines, which as discussed are relatively sparsely populated. In addition, the Proposed Development adheres to the recommended 500m set back distance in the WEDGs (DoEHLG, 2006) and also the 4 times tip height set-back distance set out for residential visual amenity prescribed by the draft WEDGs (DoPHLG, 2019). 'Significant' visual effects were deemed to arise in relation to a very low number of residential properties located within 800m of the proposed turbines.

Cumulative visual effects are likely to arise given the addition of the Proposed Development within a landscape area where existing wind farms are located nearby. The Proposed Development will be viewed in the same viewshed as the existing Carrig and Skehanagh turbines with combined (in succession) views occurring along the stretch of the N52 within 5km of the site. Additionally, intermittent vegetation along the roadside will result in sequential views of both the proposed and cumulative turbines. It is considered that with only intermittent views of the Proposed Development along the N52, resulting from different levels of screening at different locations, combined with the setback distance of both the Proposed Development from the N52 and the cumulative turbines, the addition of the Proposed Development will not give rise to 'Significant' cumulative visual effects.

Sequential cumulative visual effects will also occur along the R438 where the Proposed Development Site and Cloghan, Meenwuan and Derrinlough windfarms are seen, at a different point along the road. However, it is noted that there is a substantial distance between this group of cumulative turbines and the Proposed Development (approx. 12.1km) and so cumulative visual effects are not deemed to be 'Significant'.

In combination cumulative effects are likely to arise as cumulative are visible at certain limited locations along with the Proposed Development within the LVIA Study Area (Scenic View O-V16). However, given the substantial distance of the turbines from this viewpoint, the turbines are seen in the background of the view as small vertical elements that do not obstruct any scenic views within the landscape. Overall, any cumulative visual effects that arise as a result of the Proposed Development are not deemed to be 'Significant'.

The heavily vegetated landscape within the Proposed Development Site assists in minimising the visual extent of turbines and allows the landscape to accommodate multiple windfarms, which the photomontage assessment tables contained in Appendix 14-3 has covered in detail.

In conclusion, the Proposed Development is an appropriately designed and suitably scaled project, there are no 'Significant' landscape effects and the only 'Significant' visual effects deemed to arise were in relation to a very low



number of residential properties located within 800m of the proposed turbines. Overall, visual effects throughout the LVIA Study Area were limited as a result of the lack of visibility of the Proposed Development, in general, in the wider area.

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1.15 Material Assets

Roads, Traffic, Transport & Access

Introduction

An assessment of the traffic effects was undertaken for the proposed Carrig Renewables Wind Farm (Proposed Development). The Proposed Development consists of 7 wind turbines, an on-site substation and a grid connection underground cabling route. The site is located approximately 8 kilometres southwest of Birr and 12 kms northeast of Borrisokane, Co. Tipperary.

The assessment considers the likely impacts on the surrounding road network resulting from the additional traffic that will be generated during the construction, operational and decommissioning stages of the Proposed Development. An assessment of the geometric requirements of the abnormally sized vehicles required to deliver the turbine plant to the site was also undertaken on the proposed turbine delivery route.

Traffic Route & Study Area

The Turbine Delivery Route (TDR) delivery route to the site for the abnormally sized loads required to transport the turbine components (blades, towers and nacelles) commences at the Port of Foynes in County Limerick. From the port the delivery route travels east on the N69 before joining the M7 to the southwest of Limerick City. The route then travels south of Limerick on the M7 heading east in the direction of Roscrea and Borris-in-Ossory. The route then turns left off the M7 junction 21 slip road to travel towards the Proposed Development site on the national and local road network. From the M7 the turbine delivery route heads north on the R435 for 2.3km to the roundabout with the R445 to the west of Borris-in-Ossory. The turbine route then turns left heading west on the R445 for 9.4 kms to the roundabout with the N62. From here the route travels west on the N62 for 19.6kms through Roscrea before traveling northwest to the town of Birr. Just to the south of Birr town centre the route then turns left onto the N52 travelling southwest for 7.1 kms through Riverstown to the junction with the L5040 Local Road. At this location the route heads west on the L5040 for 1.2kms to the proposed site access junction which is located on the north side of the local road.

Vehicle types and network geometry

The types of vehicles that will be required to negotiate the local network will be up to 87.5 metres long and will carry a blade 81.5 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 development are highlighted, with the extent of remedial works identified. At one location where the geometry is constrained (Location 7 – a roundabout on the N52 southwest of Birr) it is proposed to raise the blade tip using a scissors lifter.

In addition to the assessment presented, it is recommended that a dry run is undertaken by the transport company to check vertical and horizontal clearance on the transport route prior to construction.

Traffic impact on local network

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

- During the 7 days when the concrete foundations are poured, an additional 582 PCUS will travel to and from the Proposed Development site. It is forecast that the effects will be negative, resulting in an increase in traffic volumes ranging from +3.7% on the M7 (Link 9), to +13.6% on the R445 at Borris-in-Ossory (Link 8), to 8.9% on the N62 north of Roscrea (Link 7), to 22.2% on the N52 north of the L5040 (Link 2) approaching the Proposed Development site. On the L5040 leading to the Proposed Development site it is forecast that traffic flows will increase by 200.2% on these 7 days.

- It is estimated that this will have a temporary, slight, negative effect on the N62 and N52, and a temporary moderate negative effect on the L5040.
- During the remaining 222 days when the Proposed Development site preparation and groundworks stage, an additional 585 PCUS will travel to and from the Proposed Development site. It is forecast that the increase in traffic volumes will range from +3.7% on the M7 (Link 9), to +13.6% on the R445 at Borris-in-Ossory (Link 8), to 8.9% on the N62 north of Roscrea (Link 7), to 22.3% on the N52 north of the L5040 (Link 2) approaching the Proposed Development site. On the L5040 leading to the Proposed Development site it is forecast that traffic flows will increase by 201.1% on these 222 days. Similarly, this will have a temporary slight negative effect on the N62 and N52, and a temporary moderate negative effect on the L5040.
 - With respect to the traffic volumes that will be generated during the construction of the underground electrical cabling route, it is estimated that there will be approximately 14 daily return trips made by a truck transporting materials, and 4 return trips made by a car to transport construction staff, to and from the site. By its nature the impacts of these additional trips on the network will be transient and will therefore be temporary and slight.
 - During the 19 days / nights that the abnormal loads carrying the large turbine components travel to the Proposed Development site, an additional 105 PCUs will travel on the turbine delivery route. It is forecast that the increase in traffic volumes on these days will range from +0.7% on the M7 (Link 9), to +2.4% on the R445 at Borris-in-Ossory (Link 8), to 1.6% on the N62 north of Roscrea (Link 7), to 4.0% on the N52 north of the L5040 (Link 2) approaching the Proposed Development site. On the L5040 leading to the Proposed Development site it is forecast that traffic flows will increase by 36.1% on these 19 days. It is forecast that there will be a temporary, slight negative effect on traffic flows as the delivery of the abnormally sized loads is undertaken at night.
 - During the 9 days that an additional 64 PCUs will travel to/from the Proposed Development site delivering smaller component parts using standard HGVs, it is forecast that the increase in traffic volumes on these days will range from +0.4% on the M7 (Link 9), to +1.5% on the R445 at Borris-in-Ossory (Link 8), to 1.0% on the N62 north of Roscrea (Link 7), to 2.4% on the N52 north of the L5040 (Link 2) approaching the Proposed Development site. On the L5040 leading to the site a 22% increase is forecast. On these days it is considered that the additional traffic will have a temporary imperceptible negative effect on the N62 and N52, and a temporary slight negative effect on the L5040.
 - It was determined that the junction between the N52 and the L5040 will operate in capacity for all days within the construction period.

A Traffic Management Plan was prepared, with measures proposed to minimise the traffic related impacts during the delivery of the abnormally large loads, during the construction of the proposed cable grid connection route, and to assist with the delivery of materials on the L5040 leading to the site.

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

Telecommunications and Aviation

Wind turbines, like all large structures, have the potential to interfere with 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.

The Proposed Development will have no significant effects on Telecommunications and Aviation once mitigation measures, outlined in Chapter 14 of this EIAR, are implemented. During the development of any large project that holds the potential to effect 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.

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

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 Development.

One 38kV overhead line traverses the site boundary close to the proposed main site entrance in the townland of Clohaskin. The local rural supply provides electricity from these overhead lines to the local residents within the vicinity of the Proposed Development. A scoping request was issued to Eirgrid in September 2022 and again in May 2023. No response was received to date.

A detailed survey of the entire Grid Connection underground electrical cabling route was prepared, picking up all identified existing services and utilities along the route and the proposed underground electrical cabling route has been designed to avoid these existing services and utilities. Prior to commencement of construction the survey of the route will be repeated and updated, to ensure any new services and utilities will not be impacted by the Proposed Development.

A Waste Management Plan (WMP) has been prepared and forms part of the Construction and Environmental Management Plan (CEMP) in Appendix 4-2 of the EIAR. The WMP outlines the methods of waste prevention and minimisation by recycling, recovery and reuse at each stage of construction of the Proposed Development. Disposal of waste will be a last resort.

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Interactions of the Foregoing

Chapter 15 of this EIAR identifying the potential significant environmental effects that may occur in terms of Population and Human Health, Biodiversity, Birds, Land, Soils and Geology, Water, Air and Climate, Noise and Vibration, Landscape and Visual, Cultural Heritage and Material Assets, as a result of the Proposed Development. All potential significant effects of the Proposed Development and the measures proposed to mitigate them have been outlined in the main EIAR. However, for any development with the potential for significant environmental effects there is also the potential for interaction between these potential significant effects.

The result of interactive effects may exacerbate the magnitude of the effects or ameliorate them or have a neutral effect. A matrix is presented in Chapter 15 of the EIAR to identify interactions between the various aspects of the environment already discussed in the EIAR. The matrix highlights the occurrence of potential positive or negative impacts during both the construction and operational phases of the Proposed Development. Where any potential interactive impacts have been identified, appropriate mitigation is included in the relevant sections (Chapters 5–14) of the EIAR.

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Major Accidents and Natural Disasters

This section of the Environmental Impact Assessment Report (EIAR) describes the likely significant effects on the environment arising from the vulnerability of the Proposed Development as detailed in Chapter 4 to risks of major accidents and/or natural disasters.

Major accidents or natural disasters are hazards which have the potential to affect the Proposed Development and consequently have potential impacts on the environment. These include accidents during construction 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, land, soil, water, air and climate and 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 15.3 of this EIAR,

The scenario with the highest risk score in terms of the occurrence of major accident and/or disaster was identified as 'Contamination' of the Proposed Development site and risk of 'Industrial Accident- Fire/Gas Explosion' during the construction, operation and decommissioning phases.

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

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