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Environmental Impact Assessment Report (EIAR)

Seskin Wind Farm, Co. Carlow

Non-Technical Summary

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1. NON-TECHNICAL SUMMARY

1.1 Introduction

This Environmental Impact Assessment Report (EIAR) has been prepared by MKO on behalf of the applicant, EDF Renewables Ireland Ltd. hereafter referred as EDF, who intends to apply to both Carlow County Council (CCC) and Kilkenny County Council (KCC) for planning permission to construct a renewable energy development which will comprise 7 No. wind turbines, and associated infrastructure in the townlands of Seskinrea and Ridge and adjacent townlands, in Co. Carlow, and a 38kV on-site substation, battery energy storage system and associated works, including underground 38kV cabling to connect to the national grid at Kilkenny 110kV substation, in the townland of Scart near Kilkenny, Co. Kilkenny.

For the purposes of this EIAR:

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

The majority of the Proposed Wind Farm and 2.0km of the Proposed Grid Connection Route are located in Co. Carlow and will be the subject of an application for planning permission to Carlow County Council. The remaining 18.1km of the Proposed Grid Connection Route is located in Co. Kilkenny, along with junction accommodation works areas for facilitation of turbine delivery and will be the subject of an application for planning permission to Kilkenny County Council.

This EIAR, along with a Natura Impact Statement ('NIS'), will accompany the applications for planning permission for the Proposed Project 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 Project.

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

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Applicant

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

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

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

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

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

Brief Description of the Proposed Project

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

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

i. *The construction of 7 no. wind turbines with the following parameters (all within Co. Carlow):*
    a. *Total tip height range of 179.5m – 180m,*
    b. *Rotor diameter range of 149m – 155m,*
    c. *Hub height range of 102.5m to 105m,*
ii. *Construction of associated foundations, hardstand and assembly areas (all within Co. Carlow);*
iii. *All associated wind farm underground electrical and communications cabling connecting the turbines and meteorological mast to the proposed onsite electrical substation including road crossing at L30372, Co. Carlow (all within Co. Carlow);*
iv. *Construction of 1 no. permanent 38kV electrical substation compound including a single-story control building with welfare facilities, all associated electrical plant and equipment, security fencing, entrance on to the access track, all associated underground cabling, wastewater holding tank and all ancillary works in the townland of Seskinrea, Co. Carlow (all within Co. Carlow);*
v. *A permanent Battery Energy Storage System within the electrical substation compound in the townland of Seskinrea, Co. Carlow (all within Co. Carlow);*
vi. *All works (within County Carlow) associated with the connection of the proposed wind farm to the national electricity grid, via underground 38kV electrical cabling predominantly within the public road corridor from the proposed onsite electrical substation in the townland of Seskinrea, Co. Carlow to the existing 110kV Kilkenny substation (all within Co. Carlow);*
vii. *Provision of 2 no. joint bays, communication chambers and earth sheath links along the underground electrical cabling route (all within Co. Carlow);*

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viii. *Reinstatement of the road and track surfaces above the cabling trench along existing roads and tracks (all within Co. Carlow);*
ix. *1 no. meteorological mast of c. 36.5m in height, and associated foundation and hard-standing area in the townland of Ridge, Co. Carlow (all within Co. Carlow);*
x. *The permanent upgrade of 1 no. existing site entrance off L3037 for the provision of construction and operational access (all within Co. Carlow);*
xi. *The provision of 1 no. new permanent site entrance and the upgrade of 1 no. existing site entrance off the L30372 (all within Co. Carlow);*
xii. *Upgrade of existing tracks/roads and provision of new site access roads, 2 no. clear span bridge crossings, junctions and hardstand areas (all within Co. Carlow);*
xiii. *2 no. temporary construction compounds with temporary offices and staff facilities in the townland of Ridge and Seskinrea, Co Carlow (all within Co. Carlow);*
xiv. *Carriageway strengthening works at 'Black Bridge' on the L1835/L3037 (Protected Structure: Kilkenny RPS Ref. D84) (within Co. Carlow and Co. Kilkenny);*
xv. *Peat and Spoil Management (all within Co. Carlow);*
xvi. *Tree Felling to accommodate the construction and operation of the proposed development (all within Co. Carlow);*
xvii. *Operational stage site signage; and*
xviii. *All ancillary apparatus and site development works above and below ground, including soft and hard landscaping and drainage infrastructure (all within Co. Carlow).*
xix. *All works (within county Kilkenny) associated with the connection of the proposed Seskin Wind Farm to the national electricity grid, via underground 38kV electrical cabling within the public road corridor to the existing Kilkenny 110kV substation (all within Co. Kilkenny);*
xx. *Provision of 16 no. joint bays, communication chambers and earth sheath links along the underground electrical cabling route (all within Co. Kilkenny);;*
xxi. *Reinstatement of the road and track surfaces above cabling trench along existing roads and tracks (all within Co. Kilkenny);*
xxii. *Carriageway strengthening works at 'Black Bridge' on the L1835/L3037 (Protected Structure RPS Ref. D84) (within Co. Carlow and Co. Kilkenny);*
xxiii. *A new temporary access road off the N78 to the L30372 in the townlands of Cloneen, Co. Kilkenny to facilitate the delivery of turbine components and other abnormal loads (all within Co. Kilkenny);*
xxiv. *All ancillary apparatus and site development works above and below ground (all within Co. Kilkenny).*

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

The majority of the Proposed Project including the 7 no. turbines and associated infrastructure, on-site 38kV substation and approximately 2 kilometres (km) of the underground grid connection cabling route is located in Co. Carlow and will be the subject of an application for planning permission to CCC. The remaining 18.1 km of the underground grid connection cabling route is located in Co. Kilkenny, along with junction accommodation works areas for facilitation of turbine delivery, will be the subject of an application for planning permission to KCC.

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

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

The actual turbine procured as part of a competitive tender process may have a power output that is marginally lower or greater than the 6.6MW turbine described in the EIAR.

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Need for the Proposed Project

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

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

Economic Benefits

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

Commercial rate payments from the Proposed Project will be provided to Carlow County Council which will be redirected to the provision of public services within Co. Carlow. These services include provisions such as road upkeep, fire services, environmental protection, street lighting, footpath maintenance etc. along with other community and cultural support initiatives.

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

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

Purpose and Structure of this EIAR

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

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

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

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

Assessment of Turbine Parameter Range within the EIAR

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

a) Total tip height range of 179.5m – 180m,
b) Rotor diameter range of 149m – 155m,
c) Hub height range of 102.5m to 105m

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

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

1.2 Background to the Proposed Project

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

The policies and targets which have been put in place at the various levels of Government in relation to renewable energy and climate change illustrate the urgent need for renewable energy developments such

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

The Proposed Project comprises the provision of 7 no. wind turbines with an estimated installed generating capacity of c. 46 MW and associated infrastructure. The Proposed Wind Farm will connect to the national grid via a 38kV underground grid connection cable from a proposed 38kV onsite substation to the existing 110kV Kilkenny substation, east of Kilkenny City. The need to decarbonise the economy and reduce emissions has always been imperative, however in recent years the urgency involved has become clearer to all stakeholders. The latest Climate Action Plan (CAP) published by the Irish Government in 2024 sets out the detail for taking action to deliver the decarbonisation required under the carbon budgets and sectorial emissions ceilings. Central to this is the set of measures set out to increase the proportion of renewable electricity to up to 80% by 2030 and a target of 9GW from onshore wind. The CAP places front and centre the facts that without urgent action, global warming is likely to be more than 2˚C above pre-industrial levels, threatening the health and livelihoods of people across the globe. Urgency of action is also a key focus of the CAP. All sectors will have to further their efforts if the core and further measures are to be achieved.

A gradual shift towards increasing our use of renewable energy is no longer viable. There is an urgency now to ensure real change happens. Renewable energy development is recognised as a vital component of Ireland's strategy to tackle the challenges of combating climate change and ensuring a secure supply of energy. Ireland is heavily dependent on the importation of fossil fuels to meet its energy need. 81.6% of energy used in Ireland is imported from abroad, higher than the EU average of almost 57.5% (National Energy Security Framework 2023). This high dependency on energy imports is highly risky and Ireland is currently extremely vulnerable both in terms of meeting future energy needs and ensuring price stability. As such, expanding indigenous renewable energy supply is critical for energy security and price stability.

Local Planning Policy

It is considered that the Proposed Project is consistent with the policies and objectives of the Carlow County Development Plan 2022-2028 and the Kilkenny County Development Plan 2021-2027.

Carlow County Development Plan 2022 – 2028

The Carlow County Development Plan 2022-2028 ("CCDP") was adopted in July 2022 and sets out Carlow County Council's policies and objectives for the proper planning and sustainable development of the County. The CCDP provides the framework within which the decision on the planning application for the Proposed Wind Farm is made.

Addressing climate change is a key underlying aim of Carlow County Council. The CCDP aims to *"to combat climate change and its impacts in the County by promoting and supporting policies and objectives which contribute towards a transition to a low-carbon and climate resilient future, and which focus on reducing greenhouse gas emissions and energy demands through appropriate and effective climate mitigation and adaptation measures."*

The Proposed Wind Farm site, located in the Killeshin Hills, is deemed to have a *'moderate capacity'* for wind energy development in the CCDP.

The Proposed Project is supported by local policy LA. P7 which is as follows:

LA P7: *Facilitate, where appropriate, developments that have a functional and locational requirement to be situated on steep or elevated sites (e.g. reservoir, telecommunication masts or wind energy structures) where residual adverse visual impacts are minimised or mitigated.*

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Carlow Renewable Energy Strategy

The Carlow County Renewable Energy Strategy (RES) was adopted as Appendix VI of the CCDP 2022 – 2028 in May 2022. The RES superseded the Wind Energy Strategy (WES) included as Appendix 5 of the previous CDP (2015-2021).

The selection of the Seskin Wind Farm site began in 2019 and was guided by the previous WES which was in effect at the time. The selection of the site was made with consideration for the 'Preferred Areas' as identified by the WES. These 'Preferred Areas' were areas that were considered 'suitable for wind farm development' and were located in the Killeshin Hills and the Ballymoon Esker area. In the RES, adopted in 2022, the Proposed Wind Farm site was zoned as '*Not Normally Permissible*' (NNP) for wind energy development. The NNP zoning was based on the '*Uplands*' Landscape Character Type and its landscape sensitivity rating.

Despite this zoning, the RES states the following in relation to the Killeshin Hills Landscape Character Area;

"In the western area of the county, in the Killeshin Hills landscape character area, close to border with County Kilkenny, the wind speeds are favourable and there are no environmental designations that preclude wind farm construction."

It is found that the RES wind energy zoning of NNP is in contradiction with other local policies which support the Proposed Project. The analysis within the planning report that accompanies this EIAR indicate that County Carlow will not be able to adequately contribute to the national wind energy target of 9GW if the 'Not Normally Permissible' wind energy zoning is strictly applied.

Kilkenny County Development Plan 2021 – 2027

The Kilkenny City and County Development Plan 2021-2027 (KCDP) was adopted on 15th October 2021. The KCDP outlines the overall strategy for the proper planning and sustainable development of County Kilkenny.

In relation to electricity, the KCDP recognises that there is a need to increase electrical infrastructure capacity and security.

'The Council will support the development of a safe, secure and reliable supply of electricity and to support and facilitate the development of enhanced electricity networks and facilitate new transmission infrastructure projects that might be brought forward in the lifetime of this plan'

Objective 11A of the KCDP supports the integration of the renewable energy generators to the national electricity grid, objective 11A is states:

'Objective 11A To support and facilitate the provision of energy in accordance with Ireland's transition to a low carbon energy future by means of the maintenance and upgrading of electricity and gas network grid infrastructure and by integrating renewable energy sources and ensuring our national and regional energy system remains safe, secure and ready to meet increased demand as the regional economy grows over the period of the plan.'

Kilkenny County Council also make a provision for developments which traverse county boundaries, such proposals will be considered in light of the criteria above and will be treated by the Council as if it were required to service a development within Kilkenny County Council.

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Wind Energy Development Guidelines

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

The aim of these guidelines is to assist with the proper planning of wind energy projects in appropriate locations around Ireland. The Guidelines highlight general considerations in the assessment of all planning applications for wind energy. They set out advice to planning authorities on planning for wind energy through the development plan process and in determining applications for planning permission. They contain guidelines to ensure consistency of approach throughout the country in the identification of suitable locations for wind energy development. Each wind project has its own characteristics and defining features, and it is therefore impossible to write specifications for universal use. Furthermore, Guidelines should be applied practically and do not replace existing national energy, environmental and planning policy. While the Guidelines remain the relevant guidelines in place at the tie of lodgement, and decision makers (An Bord Pleanála and Local Authorities) are required to have regard to them, they are not bound to apply their provisions and they can (and do), where there is sufficient justification, consider updated standards/requirements/specifications in assessing impacts and the proper planning and sustainable development of the area.

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

The Department of Housing, Planning and Local Government published the Draft Guidelines in December 2019 and they remain in draft at the time of writing. The Draft Guidelines note that potential impacts of wind energy development proposals on the landscape, including the natural and built environment, must be considered along with the legitimate concerns of local communities. The design of the Proposed Wind Farm has been designed in accordance with the Guidelines and has also been developed with the provisions of the Draft Guidelines in mind (for example in relation to 4 times turbine tip height set back distance from sensitive properties).

Planning History

A planning search was carried out through Carlow and Kilkenny County Council's online planning portal in April 2024 for relevant planning applications within the red line planning application site boundary. 1 no. of extant permissions was identified in County Carlow and 3 no. of extant permissions were identified in County Kilkenny. 1 no. Strategic Infrastructure Development (SID) was also identified. This SID application relates to works at Black Bridge, part of the White Hills wind farm application. The planning permissions include a meteorological mast and other energy-related infrastructure. The planning search also found 16 no. wind energy applications within 25km of the site. Planning applications in the wider area primarily consist of residential and agricultural applications.

Scoping and Consultation

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

to the Proposed Wind Farm Site. Chapter 2 includes a list of scoping consultees and responses received, with full copies of all scoping responses received set out in Appendix 2-1 of the EIAR.

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

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

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

Cumulative Impact Assessment

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

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

The potential for cumulative impacts arising from other plans and/or projects has therefore been fully considered within this EIAR. The cumulative impact assessment of projects has three principle aims:

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

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

Geographical boundaries within which there may be potential for cumulative impacts to arise, relative to each individual EIAR topic (i.e. each chapter) is set out within the Chapter. To gather a

comprehensive view of cumulative impacts within the cumulative study area and to inform the EIA process being undertaken by the competent authority, each relevant chapter within the EIAR addresses the potential for cumulative effects where appropriate and within the context of their identified cumulative study area. A long list of all plans and/or projects considered by each of the different disciplines in their cumulative impact assessment are included in Appendix 2-3 of the EIAR.

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1.3 Reasonable Alternatives

This section of the EIAR contains a description of the reasonable alternatives that were studied by the Applicant, which are relevant to the Proposed Project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the environmental effects. The consideration of alternatives typically refers to alternative design, technology, location, size and scale. A 'Do-Nothing Alternative' i.e., an outline of what is likely to happen to the environment should the Proposed Project not be implemented, has also been considered.

Alternative Locations

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

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

- **Grid Connection**: Proximity to the national grid node;
- **Wind Speed:** Average annual wind speeds conducive to wind energy development;
- **Designated Sites:** Located outside of EU Natura 2000 sites; locations outside of National designations; located outside of Article 17 Annex I Habitats;
- **Sensitive Properties**: Capable of complying with required setbacks from sensitive properties.
- **Residential Density:** Sufficient area of unconstrained land that could potentially accommodate a wind farm development and turbine spacing requirements.
- **Landscape:** Appropriate landscape setting for a wind energy development
- **Planning Policy:** Compliance with County Development Plan Renewable Energy Strategy for wind energy development;

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

Despite favourable site characteristics, the site is currently zoned '*not normally permissible*' in the Carlow County Renewable Energy Strategy, which is included in the Carlow County Development Plan 2022-2028. However, a robust analysis of wind energy constraints in Co. Carlow has indicated that sites such as the Proposed Project site, do have development potential and can contribute towards the wind energy targets set out in international national and local policy. A Planning Policy Rationale report has been prepared in support of the Proposed Project. The objective of this document is to present a planning policy rationale for the Proposed Project.

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

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Alternative Renewable Energy Technologies

During the initial stages of the Proposed Project design, a combination of solar energy and wind energy were considered 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 Project site (c. 46.2MW), a larger development footprint would be required. As detailed in Section 1.1.1 in Chapter 1, the EIAR site boundary encompasses an area of approximately 370 hectares and the permanent footprint of the Proposed Project measures approximately 7.3 hectares, which represents approximately 2% of the site. In order to achieve a c. 46.2MW output using solar PV arrays, there would be a requirement of approximately 73.9ha, which represents approximately 20% of the site.

Alternative Turbine Numbers and Model

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

Alternative Turbine Layout and Development Design

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

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

Alternative Design of Ancillary Structures

The ancillary structures required for the Proposed Project include construction compounds and underground electrical cabling.

The temporary construction compounds will be used for the storage of all construction materials, turbine components, staff facilities and car-parking areas for staff and visitors. The use of two temporary construction compounds was deemed preferable to the alternative of a single large compound. Principally, it will result in shorter distances for traffic movements within the site during construction.

In order to facilitate the construction of the Proposed Project, all of the crushed stone, hardcore materials and ready-mix concrete that will be required during the construction phase will be sourced from local, appropriately authorised quarries. The transport routes for general construction materials for the purposes of this assessment, is as per the access routes considered for the turbine plant traffic. The use of onsite borrow pits would eliminate the need to transport large volumes of construction material along the local public road network to the site. However, when considering the site characteristics, including topography, ground conditions, ecological receptors, and surface features, it was determined not to develop an onsite borrow pit.

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Alternative Grid Connection Cabling Route Options

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

- Carlow 110kV Electricity Substation
- Kilkenny 110kV Electricity Substation

The following options for connection the Proposed Project to the national grid were considered:

- Option 1a: underground grid connection cable (UGC)) route from Carlow 110kV Substation to the onsite 38kV substation location
- Option 1b: underground grid connection cable (UGC) (single circuit) route from Carlow 110kV substation to the onsite 38kV substation location
- Option 2: underground grid connection cable (UGC) (single circuit) route from Kilkenny 110kV substation to the onsite 38kV substation location.

Option 2 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. The cabling route measures to the existing Kilkenny 110kV substation is approximately 20.1km in length and is the shortest grid connection route, it requires less watercourse crossings than Option 1a and 1b and has a more favourable alignment due to the reduced presence of bends and obstructions.

Alternative Transport Route and Site Access

The alternatives considered for the port of entry of wind turbines into Ireland for the Proposed Project include the Port of Galway, Shannon Foynes Port, the Port of Waterford, 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. The Port of Waterford offers Lift-On Lift-Off, Bulk Handling, Project Pilotage, Towage & Tugs, Rail Transport, Cruise, Storage and Rental services. All four ports, and indeed others in the state, offer potential for the importing of turbine components. The primary chosen port of entry is the Port of Waterford due to its proximity from the port to the M9 motorway, in which the exit to the national and regional roads towards the Proposed Project is accessible and the storage capacity for wind farm infrastructure is available.

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The chosen Turbine Delivery Route from the Port of Waterford utilises the Motorway network (M9), National Road network (N25, N29, N9 N78) and the local road network (L1834, L1835, L3037). This route involves the vehicle exiting the M9 at Junction 3 to Athy and travelling southwest towards the Proposed Wind Farm. This route was chosen due to fewer potential pinch points where road widening may be required along the route compared to other potential routes assessed.

Alternative Mitigation Measures

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

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

1.4 Description

This section of the Environmental Impact Assessment Report (EIAR) describes the Proposed Project and all its component parts. Two separate planning applications, relating to the Proposed Project, will be made to Carlow County Council and to Kilkenny County Council. This chapter also describes elements of the overall project which are not subject to this planning application but are assessed in this EIAR. Construction methodologies for the main infrastructural components of the development are also included in this chapter (or its associated appendices) of the EIAR.

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

i. *The construction of 7 no. wind turbines with the following parameters (all within Co. Carlow):*
    a. *Total tip height range of 179.5m – 180m,*
    b. *Rotor diameter range of 149m – 155m,*
    c. *Hub height range of 102.5m to 105m,*
ii. *Construction of associated foundations, hardstand and assembly areas (all within Co. Carlow);*
iii. *All associated wind farm underground electrical and communications cabling connecting the turbines and meteorological mast to the proposed onsite electrical substation including road crossing at L30372, Co. Carlow (all within Co. Carlow);*
iv. *Construction of 1 no. permanent 38kV electrical substation compound including a single-story control building with welfare facilities, all associated electrical plant and equipment, security fencing, entrance on to the access track, all associated underground cabling, wastewater holding tank and all ancillary works in the townland of Seskinrea, Co. Carlow (all within Co. Carlow);*
v. *A permanent Battery Energy Storage System within the electrical substation compound in the townland of Seskinrea, Co. Carlow (all within Co. Carlow);*
vi. *All works (within County Carlow) associated with the connection of the proposed wind farm to the national electricity grid, via underground 38kV electrical cabling predominantly within the public road corridor from the proposed onsite electrical substation in the townland of Seskinrea, Co. Carlow to the existing 110kV Kilkenny substation (all within Co. Carlow);*
vii. *Provision of 2 no. joint bays, communication chambers and earth sheath links along the underground electrical cabling route (all within Co. Carlow);*

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viii. *Reinstatement of the road and track surfaces above the cabling trench along existing roads and tracks (all within Co. Carlow);*
ix. *1 no. meteorological mast of c. 36.5m in height, and associated foundation and hard-standing area in the townland of Ridge, Co. Carlow (all within Co. Carlow);*
x. *The permanent upgrade of 1 no. existing site entrance off L3037 for the provision of construction and operational access (all within Co. Carlow);*
xi. *The provision of 1 no. new permanent site entrance and the upgrade of 1 no. existing site entrance off the L30372 (all within Co. Carlow);*
xii. *Upgrade of existing tracks/ roads and provision of new site access roads, 2 no. clear span bridge crossings, junctions and hardstand areas (all within Co. Carlow);*
xiii. *2 no. temporary construction compounds with temporary offices and staff facilities in the townland of Ridge and Seskinrea, Co Carlow (all within Co. Carlow);*
xiv. *Carriageway strengthening works at 'Black Bridge' on the L1835 / L3037 (Protected Structure: Kilkenny RPS Ref. D84) (within Co. Carlow and Co. Kilkenny);*
xv. *Peat and Spoil Management (all within Co. Carlow);*
xvi. *Tree Felling to accommodate the construction and operation of the proposed development (all within Co. Carlow);*
xvii. *Operational stage site signage; and*
xviii. *All ancillary apparatus and site development works above and below ground, including soft and hard landscaping and drainage infrastructure (all within Co. Carlow).*
xix. *All works (within county Kilkenny) associated with the connection of the proposed Seskin Wind Farm to the national electricity grid, via underground 38kV electrical cabling within the public road corridor to the existing Kilkenny 110kV substation (all within Co. Kilkenny);*
xx. *Provision of 16 no. joint bays, communication chambers and earth sheath links along the underground electrical cabling route (all within Co. Kilkenny);;*
xxi. *Reinstatement of the road and track surfaces above cabling trench along existing roads and tracks (all within Co. Kilkenny);;*
xxii. *Carriageway strengthening works at 'Black Bridge' on the L1835 / L3037 (Protected Structure RPS Ref. D84) (within Co. Carlow and Co. Kilkenny);*
xxiii. *A new temporary access road off the N78 to the L30372 in the townlands of Cloneen, Co. Kilkenny to facilitate the delivery of turbine components and other abnormal loads (all within Co. Kilkenny);;*
xxiv. *All ancillary apparatus and site development works above and below ground (all within Co. Kilkenny).*

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

The Proposed Project includes for an onsite 38kV electricity substation and the Proposed Grid Connection Route, connecting the onsite substation to the national electricity grid via the existing Kilkenny 110kV electricity substation located in the townland of Scart, Co. Kilkenny. The Proposed Grid Connection Route will be located within the public road corridor or existing tracks for its entire length. The total length of the Proposed Grid Connection Route is approximately 20.1km, of which 2km is located within Co. Carlow and 18.1km is located within Co. Kilkenny.

It is proposed to construct a 38kV electricity substation within the Proposed Project site within agricultural land and will be accessed via the internal Proposed Wind Farm site road network. The footprint of the proposed onsite 38kVsubstation compound measures approximately 2,350 square metres in area and will include 1 no. control buildings and the electrical substation components necessary to consolidate the electrical energy generated by each wind turbine and export that electricity from the onsite 38kV substation to the national grid. A battery-based energy storage system (BESS) will adjoin the 38kV onsite substation and is located within the substation compound. The BESS primarily consists of 4 no. steel containers assembled in rows within the BESS compound at the site.

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The proposed wind turbine layout has been optimised using wind farm design software (WindPro) to maximise the energy yield from the Proposed Project, while maintaining sufficient distances between the proposed turbines so as to ensure turbulence and wake effects do not compromise turbine performance. The Grid Reference coordinates of the proposed turbine locations are listed in Table 1-2 below.

Table 1-1 Proposed Wind Turbine Locations and Elevations

Turbine	ITM X	ITM Y	Top of Foundation Levels (metre OD)
T1	663467	669637	252
T2	663996	669653	269
T3	664205	669229	260
T4	663569	669075	252
T5	664134	668661	254
T6	663450	668611	242
T7	663626	668143	252

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

- Turbine Tip Height – Maximum height 180 metres, Minimum height 179.5 metres
- Hub Height – Maximum height 105 metres, Minimum height 102.5 metres
- Rotor Diameter - Maximum diameter 155 metres, Minimum diameter 149 metres.

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

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

The Proposed Project site makes use of the existing road network insofar as possible. It is proposed to upgrade approximately 2.8 kilometres of existing site roads and tracks, and to construct approximately 2.7 kilometres of new access road on the Proposed Wind Farm site. It is proposed to construct passing bays along the proposed access road network.

Each turbine will be connected to the on-site electricity substation via underground 20kV or 33kV (kilovolt) electricity cabling. Fibre-optic cables will also connect each wind turbine and the met mast to the onsite substation. The electricity and fibre-optic cabling connecting to the onsite substation compound will be run in cable ducts in the road or direct buried alongside the internal tracks approximately 0.9 metres beneath ground level to the top of the cable.

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

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Two temporary construction compounds will be located within the Proposed Project site. The primary construction compound will be located adjacent to Turbine No. 6 and the secondary construction compound will be located adjacent to the onsite substation. The temporary construction compounds will consist of a bunded refuelling and containment area for the storage of lubricants, oils, and site generators etc, and full retention oil interceptor, waste storage area, temporary site offices, staff facilities and car-parking areas for staff and visitors.

It is proposed to construct an onsite 38kV substation within the Proposed Wind Farm site. The proposed onsite 38kV substation is located within agricultural land and will be accessed via the internal Proposed Project site road network. The footprint of the proposed onsite 38kVsubstation compound measures approximately 2,350 square metres in area and will include 1 no. control buildings and the electrical substation components necessary to consolidate the electrical energy generated by each wind turbine and export that electricity from the onsite 38kV substation to the national grid.

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

As part of the Proposed Project, tree felling will be required within and around development footprint to allow for the construction of the turbine bases, access roads underground cabling, and other ancillary infrastructure. Further details on tree felling required within and around development footprint on the Proposed Project site is detailed in Chapter 6 of this EIAR. A total of 19 hectares of forestry will be permanently felled within and around the Proposed Project along with existing treeline boundaries.

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

A Green Infrastructure Plan has been prepared for the Proposed Project and is included in Appendix 4-3 of this EIAR. This plan identifies, in a layout drawing, the Proposed Project layout and the relevant biodiversity, hydrological and landscape features of the Proposed Project that are detailed in the EIAR.

It is proposed to access the Proposed Project site during both the construction and operational phase via an existing agricultural site entrance off the L3037 local road along the western boundary of the Proposed Wind Farm site in the townland of Ridge. This entrance will be widened to facilitate the delivery of the construction materials and turbine components. The proposed works will result in a permanent upgrade of this existing site access from the L3037 local road, which will also form the main site entrance to the Proposed Wind Farm during the operational phase.

In order to facilitate the construction of the Proposed Project, all crushed stone, hardcore materials and ready-mix concrete that will be required during the construction phase will be sourced from local, appropriately authorised quarries

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

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

The wind turbines proposed as part of the Proposed Wind Farm site 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 site may be decommissioned fully. The underground electrical cabling and onsite 38kV substation will remain in place as it will be under the ownership and control of the ESB and EirGrid.

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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 Wind Farm site is located approximately 3.1 km northwest of the village of Oldleighlin, Co. Carlow, 5km northwest of Leighlinbridge, Co. Carlow, and 9.9 kilometres southeast of Castlecomer, Co. Kilkenny. It is proposed to access the Proposed Project via upgrades to an existing agricultural entrance off the L3037 Local Road along the western boundary of the Proposed Project site. The Proposed Project is served by a number of existing public, forestry and agricultural roads and tracks.

The Proposed Grid Connection Route includes for underground 38kV cabling from the proposed onsite 38kV substation, in the townland of Seskinrea, Co. Carlow, to the existing Kilkenny 110kV substation in the townland of Scart, Co. Kilkenny. The underground cabling route to Kilkenny, measuring approximately 20.15 km in length, is primarily located within the public road corridor.

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

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

There is currently no peer reviewed scientific evidence to positively link wind turbines with adverse health effects. The main publications supporting the view that there is no evidence of any direct link between wind turbines and health are summarised in Chapter 5 of this EIAR. Although there have been no empirical studies carried out in Ireland on the impacts of wind farms on property prices, the literature described above demonstrates that at an international level, wind farms have potential to impact property values in local areas; however, it is important to note that this impact is proven to reduce throughout the operational phase of a wind farm.

Residential amenity relates to the human experience of one's home, derived from the general environment and atmosphere associated with the residence. The quality of residential amenity is influenced by a combination of factors, including site setting and local character, land-use activities in the area and the relative degree of peace and tranquillity experienced in the residence.

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When considering the amenity of residents in the context of a proposed wind farm, there are four main potential effects of relevance: 1) Shadow Flicker, 2) Noise, and 3) Visual Amenity and 4) Telecommunications. Shadow flicker, telecommunications and noise are quantifiable aspects of residential amenity while visual amenity is more subjective.

Shadow flicker is an effect that occurs when rotating wind turbine blades cast shadows over a window in a nearby property. Shadow flicker is an indoor phenomenon, which may be experienced by an occupant sitting in an enclosed room when sunlight reaching the window is momentarily interrupted by a shadow of a wind turbine's blade. Outside in the open, light reaches a viewer (person) from a much less focused source than it would through a window of an enclosed room, and therefore shadow flicker assessments are typically undertaken for the nearby adjacent properties around a proposed wind farm site. The current guidance for shadow flicker in Ireland is derived from the DoEHLG 2006 Guidelines and the '*Best Practice Guidelines for the Irish Wind Energy Industry*' (Irish Wind Energy Association, 2012). The adopted DoEHLG 2006 Guidelines are currently under review. The Draft DoEHLG 2019 Guidelines recommend local planning authorities and/or An Bord Pleanála impose conditions to ensure that:

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

The DoEHLG 2006 Guidelines set out a threshold of 30 hours per year or 30 minutes per day of shadow flicker at sensitive receptors within 500 metres of a proposed turbine location. As set out in the DoEHLG 2006 Guidelines, there is a low probability of any shadow flicker effects occurring beyond 10 rotor diameters. A study area of 10 rotor diameters was assessed for shadow flicker effects. In this case, the maximum rotor diameter proposed for this project is 155m. As such, the Shadow Flicker Study Area in this case is 1.55km. A significant minimum separation distance of 724m from third party dwellings has been achieved with the project design. There are 117 no. properties located within 1.55 km of the proposed turbines as detailed above, of which 13 dwellings are Participating Properties and 6 are in derelict condition (of which 3 are Participating Properties).

The potential shadow flicker occurring at sensitive receptors located within the Shadow Flicker Study Area was calculated using the WindFarm computer software (version number 5.0.2.2) and a regional sunshine factor of 29.79% was applied. Of the 117 no. sensitive receptors modelled, it is predicted that 61 no. sensitive receptors may potentially experience daily and annual shadow flicker, in the absence of mitigation measures. Chapter 5 outlines the mitigation strategies which may be employed at the potentially affected properties to ensure that the Draft DoEHLG 2019 Guidelines are complied with at any dwelling within the 1.55km Shadow Flicker Study Area. Therefore, the developer will commit to mitigation measures that will ensure that there are no occurrences of shadow flicker for any property within the 1.55km Shadow Flicker Study Area, as a result of the Proposed Wind Farm.

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

1.6 Biodiversity

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Chapter 6 of the EIAR assesses the likely significant effects (both alone and cumulatively with other projects) that the Proposed Project 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 were carried out. Multidisciplinary walkover surveys (including habitats) were undertaken on the 19th and 20th of July, the 22nd and 24th of August, the 22nd of September and the 29th and 30th of November in 2022. In 2023, further multidisciplinary walkover surveys were conducted on the 5th of January, the 15th of February, the19th and 20th of July and the 24th of October.

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

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

Habitat surveys were undertaken within the recognised optimum period for vegetation surveys/habitat mapping, i.e. April to September (Smith et al., 2011). Habitats on 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). Detailed botanical surveys/relevé assessments of the Proposed Project were also undertaken the results of which are provided in technical appendices to this EIAR.

The Proposed Wind Farm site comprises predominantly of agricultural land categorised as improved agricultural grassland (GAI) and/or wet grassland (GS4) and forestry categorised as either conifer plantation (WD4) or recently felled (conifer) woodland (WS5). These were the two dominant habitat types recorded throughout the Proposed Wind Farm site. Hedgerow habitat (WL1) was limited in extent throughout the site, mainly associated with existing farm access tracks and or field boundaries, this habitat where present was often associated with stonewalls (BL1) and earth banks (BL2). Three watercourses were recorded within the Proposed Wind Farm site all of which drain to the west side of the Proposed Wind Farm site. All three watercourses within the Proposed Wind Farm site were classed as upland eroding streams (FW1). No Annex I habitats were recorded within the EIAR Site Boundary.

The majority of the lands on either side of the road along the length of the Proposed Grid Connection Route (which is restricted to the existing road) comprised improved agricultural grasslands (GA1), wet grassland (GS4) occasional scrub (WS1) and buildings and artificial surfaces (BL3). Further south mixed broadleaved/conifer woodland (WD2) and conifer plantation (WD4) were also recorded. The Proposed Grid Connection Route will involve 10 No. watercourse crossings comprising 7 No. bridge crossings (all of which will involve Horizonal Directional Drilling) and 3 No. existing culverts crossings.

The Proposed Project will result in the loss of approximately 2.1ha of wet grassland (GS4), 0.8ha of improved agricultural grassland (GA1), and 19ha of forestry made up of 6ha of recently felled (conifer) woodland (WS5) and 13ha of conifer plantation (WD4) all of which have been assessed as being of Local Importance (lower value), which is not considered significant at any scale. The Proposed Grid Connection Route will not result in the permanent loss of any habitat. The works will be restricted to

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the existing road categorised as Buildings and Artificial Surfaces (BL3). This is not significant at any geographic scale.

The construction of the Proposed Project will however result in the loss of approx. 540m of Hedgerow (WL1) and associated stone walls (BL1) and 82m of Treeline (WL2) habitat, these habitats were assessed as being of Local Importance (higher value) and the loss of such habitats were considered to be significant at the local geographic scale. Measure to mitigate for this loss of habitat are incorporated into the Biodiversity Management and Enhancement Plan (BMEP) for the Proposed Project, this includes the planting of up to 3,350 linear metres of new hedgerow, treeline and shrub planting. The BMEP will commence during the construction phase of the Proposed Project. These measures included will provide a biodiversity net gain as part of the Proposed Project.

Bat species composition and abundance within the Proposed Wind Farm site was considered to be typical of the geographic location of the site and the habitats which it supports. No bat roosts were identified within the Proposed Project site. All bat species (excluding *Myotis spp.)* recorded within the Proposed Project site were considered to be part of bat populations of Local Importance (Higher Value). The Myotis spp. population recorded within the site is considered likely to include bats of National and International Importance, as the Proposed Project site is located within 1.1km of Mothel Church, Moycullen proposed National Heritage Area (pNHA) which supports one of the largest Natterer bat nursery roost in the country. The Proposed Project site consists primarily of conifer plantation which does not provide roosting habitat of significance for bats. The habitats on the Proposed Wind Farm site will remain suitable for bats and no significant displacement of individuals or populations is anticipated. Taking into consideration the sensitive design of the Proposed Project, the proposed best practice and adaptive mitigation measures, significant residual effects on bats as a result of loss or damage to commuting and foraging habitat, loss of, or damage to, roosts, displacement of individuals or populations, and disturbance, are not anticipated. In relation to potential collision risk and injury with operational turbines, detailed mitigation measures in relation to bats is provided in the Bat Report (Appendix 6-2) and summarised in Chapter 6.

All watercourses within the Proposed Wind Farm site, and along the Proposed Grid Connection Route were identified as providing potential habitat for otter and were subject to targeted surveys for this species. No signs of otter were recorded within any of the watercourses within the Proposed Wind Farm site or along the Proposed Grid Connection Route. Given the nature of the Proposed Project and the findings of the baseline surveys for otter, there is no potential for direct loss or fragmentation of otter habitat including loss of breeding or resting places and no direct mortality related impacts on this species are anticipated. Therefore, there is no potential for the Proposed Project to result in any direct impacts on otter. Any potential for indirect effects on otter was identified in the form of habitat degradation/loss of prey resource through water pollution during construction, however, with the implementation of mitigation measures in relation to the protection of water quality during construction no significant residual effects on otter are anticipated.

No badger setts were identified during the ecological surveys undertaken of the Proposed Project site, however, numerous signs of badger activity were identified within the site (latrines, snuffle holes, prints) in close proximity to the Proposed Wind Farm infrastructure. A pre-construction badger survey will be carried out to identify the presence of any setts that may have been established in the intervening period. If an active badger sett is identified prior to construction, mitigation measures in relation to badger and detailed in Chapter 6 will be implemented. Following the incorporation of the mitigation measures descried in Chapter 6, no significant negative effects to badger is anticipated at any geographic scale.

Red squirrel and pine marten are known to occur within the Proposed Wind Farm site. As detailed in Chapter 6, no significant habitat loss or fragmentation, disturbance or mortality of red squirrel or pine marten is anticipated at any geographic scale. However, a pre-construction red squirrel survey will be carried out in areas of forestry to be felled to identify the presence of any dreys that may have been established in the intervening period. If an active drey is identified prior to construction, mitigation measures in relation to this species as detailed in Chapter 6 will be implemented. Following the

incorporation of the mitigation measures descried in Chapter 6, no significant negative effects to red squirrel or pine marten is anticipated at any geographic scale. Furthermore, enhancement measures for these species have been included in the BMEP for the Proposed Project.

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Marsh fritillary larval webs were recorded within the Proposed Wind Farm site and mitigation by design was applied to the finalised Proposed Wind Farm layout. All suitable marsh fritillary habitat (incl. identified larval webs) are now located completely outside of the Proposed Wind Farm footprint as such no impacts on this species are predicted. Furthermore, enhancement measures for this species have been included in the BMEP for the Proposed Project.

There will be no significant fragmentation of common lizard habitat as a result of the Proposed Project. The removal of the stone walls to facilitate the construction of the Proposed Wind Farm has the potential to have a direct impact (risk of mortality) on this species if works to remove the stone wall are undertaken within the winter months. Following the implementation of mitigation measures described in Chapter 6 for this species no significant negative effects to common lizard is anticipated at any geographic scale.

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

In relation to European designated sites, River Barrow and River Nore SAC [002162] and River Nore SPA [004233] have been fully assessed within the Appropriate Assessment Screening and Natura Impact Statement (NIS) that accompanies this planning application along with this EIAR. The NIS has been prepared to provide the competent authorities with the information necessary to complete an Appropriate Assessment screening and an Appropriate Assessment for the Proposed Project in compliance with Article 6(3) of the Habitats Directive. The NIS concludes that the Proposed Project, 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 Project is constructed and operated in accordance with the design, best practice and mitigation that is described within this application, significant individual or cumulative effects on ecology are not anticipated for any of the identified key ecological receptors at any geographic scale.

1.7 Birds

This chapter assesses the likely significant effects that the Proposed Project may have on bird species. Firstly, a brief description of the Proposed Project is provided. This is followed by a comprehensive description of the methodologies that were followed in order to obtain the information necessary to complete a thorough assessment of the potential effects of the Proposed Project on bird species. The survey data is presented in full in the Environmental Impact Assessment Report (EIAR) appendices with a summary of the information presented within this chapter. An analysis of the results is then provided, which discusses the ecological significance of the birds recorded within the study area. The potential effects of the Proposed Project are then described in terms of the construction, operation and decommissioning phases of the Proposed Project. An accurate prediction of the effects is derived following a thorough understanding of the nature of the Proposed Project along with a comprehensive knowledge of bird activity within the Proposed Wind Farm site. The identification of Key Ornithological Receptors (KORs) and the assessment of effects follow a precautionary approach.

The following KORs were identified: golden plover, kestrel, snipe, woodcock, buzzard and sparrowhawk.

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 Project will not adversely affect the integrity of any European sites.

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Based on the detailed assessment, it is considered that the potential effects of the Proposed Project upon birds will not be significant. Effects associated with habitat loss, disturbance/displacement, collision risk and cumulative effects have been assessed to be no greater than long-term slight negative effect (EPA, 2022) and low effect significance (Percival, 2003). In conclusion, following consideration of the residual effects (post-mitigation), it is concluded that the Proposed Project 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 Project 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.

1.8 Land, Soils and Geology

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

The land, soils and geology of the Proposed Project site has been characterised using a combination of desk study and site investigation data. Several walkover inspections of the Proposed Wind Farm have been completed as well as 314 no. peat probes, gouge cores, 8 no. trial pits, 28 no. hand vane tests and laboratory analysis of recovered soil samples. A visual assessment of exposed soils, subsoil and bedrock and topographic changes along the Proposed Grid Connection Route was also completed.

Proposed Wind Farm

The Proposed Wind Farm is located in an upland area on the Castlecomer Plateau with elevations ranging from ~230 to ~271mOD (metres above Ordnance Datum). The Proposed Wind Farm slopes to the west, towards the Coolcullen River. Land at the Proposed Wind Farm site currently comprises of commercial forestry and agricultural lands.

Based on site based measurements, peat depths at the Proposed Wind Farm range from 0 to 2.7m, with an average of 0.23m. No peat was recorded at ~40% of the investigation locations. The non-peat soils and subsoils encountered during the site investigations comprised silt and clay. The local GSI mapped subsoils consist of till derived from Namurian sandstones and shales.

Depth to bedrock is relatively shallow across the Proposed Wind Farm with some bedrock exposures of sandstone and siltstone recorded during walkover surveys. However, no competent bedrock was encountered during any of the site investigations. 2 no. trial pits encountered possible weathered bedrock at depths of 1.9 and 1.6m.

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

Estimated volumes of peat and spoil to be excavated within the Proposed Wind Farm are in the region of 22,338m^3 and 34,103m^3 respectively. Excavated peat and spoil will be stored in the proposed peat/spoil repository areas with minor volumes being used for landscaping. The handling and storage of peat and spoil will be done in accordance with the Peat and Spoil Management Plan which is included as Appendix 4-2 to the EIAR.

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

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

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

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

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

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

Proposed Grid Connection Route

The Proposed Grid Connection Route from the proposed onsite 38kV substation to the existing Kilkenny 110kV substation is 20.1km in length and is located within the carriageway of the existing road network.

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

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

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

1.9 Water

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

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Regionally, the majority of the Proposed Project site is located in the River Nore surface water catchment whilst a small area in the northeast of the Proposed Wind Farm site and section of the Proposed Grid Connection Route are located in the River Barrow surface water catchment. However, no proposed infrastructure within the Proposed Wind Farm site is located within the River Barrow surface water catchment.

Proposed Wind Farm

The Proposed Wind Farm site is drained by several tributaries of the Coolcullen River. Drainage within the site is further facilitated in places by agricultural field drains, roadside drains and forestry drains depending on the local land-use. These manmade drains discharge into several headwater streams which flow into the Coolcullen River. This river flows to the north ~1km west of the Proposed Wind Farm site and discharges into the Dinin River ~1.8km to the northwest. The Dinin River discharges into the River Nore ~17km to the southwest.

The bedrock underlying the Proposed Wind Farm site is classified as Locally Important and Poor bedrock aquifer. The underlying bedrock has little or no open cracks which means groundwater movement within the aquifer is very localised. Groundwater at the site can be classed as sensitive in terms of potential effects from the Proposed Wind Farm. Depth to bedrock is relatively shallow with some exposures recorded during the walkover surveys. However, the low potential for pollutant travel within the bedrock makes surface water bodies such as streams more sensitive to pollution than groundwater. Therefore, there will be no impact on private wells as a result of the Proposed Project.

The River Barrow and River Nore SAC is located downstream and in close proximity to the Proposed Wind Farm site. This designated site can be considered to be very sensitive in terms of potential effects. Following implementation of the appropriate mitigation measures as outlined in the EIAR no significant effects on this designated site will occur as a result of the Proposed Project.

A total of 3 no. surface water drinking abstractions have been identified downstream of the Proposed Wind Farm along the Dinin River. Following implementation of the appropriate mitigation measures as outlined in the EIAR, no significant effects on these drinking water protected areas will occur as a result of the Proposed Project.

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

Surface water drainage measures, pollution control and other preventative measures have been incorporated into the project design to minimise significant effects on water quality and downstream designated sites. A self-imposed 50m watercourse buffer was used during the design of the Proposed Project, thereby avoiding sensitive hydrological features. The surface water drainage plan will be the principal means of significantly reducing sediment runoff arising from construction activities and to control runoff rates. The key surface water control measure is that there will be no direct discharge of wind farm runoff into local watercourses or into the existing site 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

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which will be incorporated into the Construction and Environmental Management Plan (Appendix 4-4 of the EIAR).

No significant effects to surface water (quality and flows) and groundwater (quality and quantity, and any local groundwater wells) will occur as a result of the Proposed Project 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 Wind Farm drainage system will be designed to slow surface water runoff from the site by providing greater attenuation. This will ensure that the Proposed Project does not alter downstream surface water flows and will not contribute to downstream flooding.

A Water Framework Directive (WFD) Compliance Assessment has been completed for all waterbodies (surface water and groundwater bodies) with the potential to be impacted by the Proposed Project and is included as Appendix 9-4 of the EIAR). With the implementation of the mitigation measures detailed in this EIAR there will be no change in the WFD status of the underlying groundwater body or downstream surface waterbodies as a result of the Proposed Project. The Proposed Project 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 Project and other developments on the hydrological and hydrogeological environment has been completed. With the implementation of the mitigation measures detailed in this EIAR, the cumulative assessment found that there will be no significant effects on the hydrological and hydrogeological environments.

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

Proposed Grid Connection Route

The Proposed Grid Connection Route from the proposed onsite 38kV substation to the existing Kilkenny 110kV substation is 20.1km and is located primarily within the carriageway of the existing road network. Within the River Nore surface water catchment there are a total of 10 no. existing watercourse crossings whilst there are no crossings located within the River Barrow surface water catchment.

Designated sites located near and downstream of the Proposed Grid Connection Route include the River Barrow and River Nore SAC, and the River Barrow and River Nore SPA. Due to the minor and transient nature of the proposed works, coupled with the prescribed mitigation measures, there will be no significant effects on downstream designated sites.

Approximately 3.3km of the Proposed Grid Connection Route is underlain by a Regionally Important Karst Aquifer. However, due to the minor, shallow and transient nature of the works, the lack of any mapped karst features in the vicinity of the Proposed Grid Connection Route and the prescribed mitigation measures, there will be no significant effect on karst features or the underlying karst aquifer.

2 no. public water supplies (Paulstown PWS and Clifden/Clara PWS) are also mapped in the vicinity of the Proposed Grid Connection Route. However, due to the minor, shallow and transient nature of the works and the prescribed mitigation measures, there will be no significant effect on these water supplies.

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

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1.10 Air Quality

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

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

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

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

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

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

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

A Construction and Environmental Management Plan (CEMP) will be in place throughout the construction phase (see Appendix 4-4 of the EIAR) and includes dust suppression measures. Following implementation of the mitigation measures detailed in Chapter 10, there will be no significant direct or indirect effects on air quality due to the construction of the Proposed Project. The overall residual effect on air quality will be a long-term moderate positive effect on air quality due to the offsetting of approximately 37,312 tonnes of CO_2 per annum (see Chapter 11 for details), due to the provision of renewable energy in the range of approximately 28,832 Irish households with electricity per year.

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

1.11 Climate

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

The production of energy from wind turbines has no direct 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.

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

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

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

A methodology was published in June 2008 by scientists at the University of Aberdeen and the Macauley Institute with support from the Rural and Environment Research and Analysis Directorate of the Scottish Government, Science Policy and Co-ordination Division. The document, '*Calculating Carbon Savings from Wind Farms on Scottish Peat Lands'*, was developed to calculate the impact of wind farm developments on the soil carbon stocks held in peat. This methodology was refined and updated in 2011 based on feedback from users of the initial methodology and further research in the area. The web-based version of the carbon calculator, which supersedes the excel based versions of the tool, was released in 2016 and is currently available as Version 1.8.1 which was last updated in 2023. The tool provides a transparent and easy to follow method for estimating the impacts of wind farms on the carbon dynamics of peatlands and was used to assess the effects of the proposed wind farm in terms of potential carbon losses and savings, taking into account removal of carbon sequestering vegetation, and operation of the Proposed Wind Farm. The model calculates the total carbon emissions associated with the proposed wind farm development including manufacturing of the turbine technology, transport, and construction of the development.

The full life cycle and embodied carbon of the proposed turbines have been taken account of in the Macauley Institute model. The emissions associated with the embodied carbon, along with the construction phase transport movements of the remaining site infrastructure associated with the Proposed Project are considered using the Transport Infrastructure Ireland (TII) Carbon Tool (TII 2022). The TII Carbon Tool is customised for road and light rail projects in Ireland, using emission factors from recognised sources during the construction, maintenance, and operation of TII projects in Ireland.

The carbon balance of proposed wind farm developments in peatland habitats has attracted significant attention in recent years. When developments such as wind farms are proposed for peatland areas, there will be direct impacts and loss of peat in the area of the development footprint. There may also be indirect impacts where it is necessary to install drainage in certain areas to facilitate construction. The works can either directly or indirectly allow the peat to dry out, locally, which permits the full

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

The Proposed Project will result in the loss of 93,080tCO_2e during the construction phase, the details of these carbon losses are provided in Table 11-6 of Chapter 11 of the EIAR. Please note, that in completion of these calculations a number of assumptions have been made under theoretical precautionary conditions; all assumptions are detailed in Appendix 11-1 Carbon Calculations. Therefore, it can be determined that the actual carbon losses associated with the Proposed Project will likely be less then the values provided in Table 11-6 of Chapter 11.

The Proposed Project will have an export capacity of approximately 46.2MW and therefore will help contribute towards the achievement of national and international emission reduction targets, provide much needed grid infrastructure, and the capacity to offset 37,312tCO_2e per annum, or 1,305,920tCO_2e over its operational lifetime, thereby reducing the greenhouse gas effect. Carbon losses to the atmosphere due to changes in soil and ground conditions and due to the construction and operation of the Proposed Project will be offset by the Proposed Wind Farm in approximately 30 months of operation. Please see Section 11.5.3.2 for details on carbon savings/offset calculations.

Following construction of the Proposed Project, there will be a Permanent Imperceptible Negative Effect on Climate as a result of greenhouse gas emissions from construction plant and vehicles, embodied carbon associated with the turbines and construction materials. Operation of the Proposed Project will have a Direct Long-Term Moderate Positive Effect on climate as a result of reduced greenhouse gas emissions.

1.12 Noise and Vibration

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

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

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

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

Predicted cumulative operational noise levels indicate that for noise sensitive receptors neighbouring the Proposed Wind Farm, cumulative wind turbine noise (which considers noise predictions from all

nearby operational and permitted wind farms and the Proposed Wind Farm) would meet the Total DoEHLG 2006 Guidelines Noise Limits at all Noise Assessment Locations. In order to meet the noise limits at one receptor, mode management would be required in daytime for a limited range of wind speeds and wind directions (6 ms^{-1} and broadly north easterlies) based on the candidate turbines considered in this assessment.

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

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

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

Noise limits have already been established for a number of NSRs located in close proximity between the Proposed Wind Farm and the permitted Bilboa Wind Farm. On that basis a Cumulative Noise Condition has been proposed whereby the Proposed Wind Farm, at the NSRs locations, would be conditioned to ensure that the cumulative wind turbine noise (from the combined operation of the permitted Bilboa Wind Farm and the Proposed Wind Farm) would meet the Cumulative Noise Limits. If the event that noise immission from the permitted Bilboa Wind Farm increased to use a greater amount of the Cumulative Noise Limit than predicted, then the Proposed Wind Farm may then need to operate to a more restrictive Backstop Noise Limits which would be set 10 dB below the Cumulative Noise Limits.

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

Predicted operational noise levels from the BESS are below the BS 8233 guideline levels at all noise sensitive receptors. Therefore, the BESS operational noise impact is not significant.

1.13 Cultural Heritage

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

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No direct effects to the recorded archaeological resource are identified. Where potential effects have been identified, such as to sub-surface archaeology, appropriate mitigation measures have been recommended in order to minimise any such effects. Recommended mitigation includes pre-development archaeological testing of the proposed infrastructure (i.e., turbine bases, hardstands, temporary construction compounds, new roads, etc) and archaeological monitoring during the construction stage of the Proposed Project. Potential direct and indirect effects to Black Bridge (RPS Ref. D84) on the proposed TDR are also effectively dealt with through appropriate mitigation measures.

Potential indirect effects on the setting of any UNESCO WHS and those on a Tentative List within 20km, National Monuments within 10km, recorded monuments within 5km and RPS/NIAH structures within 5km were included in order to assess potential effects on setting in the wider landscape. No UNESCO WHS or those on a Tentative List are located within 20km of the Proposed turbines. The ZTV demonstrates theoretical visibility of 5-7 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 a precautionary scenario in that natural screening, boundaries, buildings and vegetation are not taken into account in the ZTV model and in reality the potential effect is likely to be less. Furthermore, many of these monuments may not be readily discernible in the landscape which further ameliorates effects on setting.
All cultural heritage assets within 100m of either side of the Proposed Grid Connection Route were assessed for potential effects to same. No direct effects to the recorded archaeological, resource as a result of the Proposed Grid Connection Route have been identified. Mitigation measures are recommended where deemed appropriate and include archaeological monitoring of ground works in specified areas along the Proposed Grid Connection Route. An assessment of potential effects as a result of accommodation/upgrade works along the proposed TDR was also carried out. Mitigation measures have been recommended where appropriate, in particular with reference to proposed works to Black Bridge (RPS Ref. D84).
An assessment of potential cumulative effects was also undertaken taking into consideration other extant planning applications and existing, permitted and proposed wind farms within 20km. While some potential cumulative visual effects to the wider setting of cultural heritage assets is possible when considered with the existing, permitted and proposed wind farms, no significant cumulative impacts have been identified and no cumulative effects to the immediate setting of cultural heritage assets will occur.

1.14 Landscape and Visual

Chapter 14 of this EIAR includes the Landscape and Visual Impact Assessment (LVIA) of the Proposed Project. The LVIA comprises a comprehensive assessment of sensitive landscape and visual receptors located within a 20km LVIA Study Area. The LVIA was conducted in accordance with national and international LVIA guidance through desktop analysis, on-site appraisals, topographic and ZTV modelling and use of photomontage visualisations. This chapter presents the landscape and visual baseline conditions of the Proposed Project site, outlines the local policy context with respect to landscape and visual designations, models the ZTV to identify the landscape and visual receptors which have theoretical visibility. All receptors included for further assessment following ZTV mapping and on-site visibility appraisals are assessed, following a structured methodology grounded in best practice guidance for LVIA and impact assessment of wind energy developments. The impact assessments are informed by photomontage visualisations and information gathered during site visits. This LVIA assesses cumulative landscape and visual effects in combination with other existing, permitted and proposed wind farm developments in the LVIA Study Area.

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

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- *EIAR Volume 2: Photomontage Booklet*, Photomontage visualisations of the Proposed turbines from 15 No. representative viewpoints, including modelling of other existing, permitted and proposed wind energy developments;
- *Appendix 14-1: LVIA Methodology*, outlining the guidance and detailed methodology used for the assessments conducted in this chapter;
- *Appendix 14-2: LCA Assessment Tables*, assessing landscape and cumulative effects of 3 No. Landscape Character Areas (LCAs) included in for assessment;
- *Appendix 14-3: Photomontage Assessment Tables*, assessing visual and cumulative visual effects of the 15 No. representative viewpoints presented in the *Photomontage Booklet*;
- *Appendix 14-4: LVIA Baseline Map*, An A0 map showing all baseline landscape features, viewpoints, and visual receptors;
- *Appendix 14-5: Photowire Visualisation Booklet*, presenting photowires (early-stage/draft photomontages) from 20 No. viewpoint locations throughout the LVIA Study Area that were not included in the Volume 2 booklet – does not include modelling of other cumulative developments.

This Chapter assesses the likely significant landscape and visual impacts arising as a result of the Proposed Project. Although all elements of the Proposed Project are assessed, the Chapter focuses upon the Proposed turbines, as they are deemed to be the essential aspects of the proposal under assessment from a landscape and visual perspective. The Chapter describes the baseline landscape and assesses the direct effects on the landscape of the Proposed Wind Farm site, as well as effects on landscape character and the impact on designated LCAs. Visibility of the Proposed turbines was analysed from receptors within a study area extending 20km from the Proposed turbines; and visual effects from specific visual receptors were determined from information gathered during multiple site visits as well as other tools such as ZTV mapping and photomontages.

The Proposed Wind Farm is located in an upland plateau at the eastern periphery of the Killeshin Hills enclosed by undulating landforms to the north, west and south. Consequently, these landforms restrict visual exposure in these directions (north, west and south) as shown by the ZTV mapping which shows very limited theoretical visibility in a vast proportion of the LVIA Study Area. Most visibility occurs either in close proximity to the site (within 5km) or in the lowlands of the Barrow Valley to the east, also referred to as the Central Plains.

The site is located in a working landscape comprising of commercial forestry and agricultural fields of grazing pastures and mature hedgerows. The immediate setting of the site is a sparsely populated, working landscape, set back from large settlements and population centres. Site investigations determined that the landscape is of 'Low' landscape value and ultimately 'Low' sensitivity, with landscape attributes and characteristics making it an eminently suitable site for wind energy development from an LVIA perspective. In the context of the DoEHLG 2006 Guidelines, the site and landscape setting best represents the Transitional Marginal Landscape Character Type. The Proposed Project generally adheres to the siting and design guidance set out in the DoEHLG 2006 Guidelines for this landscape type.

Local planning policy designates the uplands where this site is located as being a landscape of high sensitivity and does not promote it as an area for wind energy development. However, analysis of policy and of the landscape itself during site investigations for this LVIA have determined that the transitional marginal upland landscape of the Killeshin Hills is capable of effectively absorbing the Proposed Project. There is also a strong planning precedent for the principle of wind energy development in this area considering the existing Gortahile Wind Farm, permitted Bilboa Wind Farm and permitted White Hill Wind Farm located in proximity to the Proposed Wind Farm site.

The landscape sensitivity of the site is deemed to be 'Low'. The introduction of vertical man-made structures and ancillary infrastructure will substantially alter the landscape comprising the proposed infrastructure footprint at the site. The magnitude of change was deemed to be 'Substantial' as the addition of uncharacteristic new features (turbines) will cause a change in landscape character. The Proposed Wind Farm site has been designed to where possible avoid effects on landscape receptors

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within the site. The Proposed Project comprises a Green Infrastructure Plan and Biodiversity Management and Enhancement Plan (Appendix 4-3 and Appendix 6-4 respectively), these plans include planting to offset loss of vegetation required to facilitate construction of the Proposed Project. The Proposed Project amounts to direct long-term 'Moderate' landscape effects upon the physical fabric and character of the landscape of the Proposed Wind Farm site.

3 No. designated LCAs were identified and included for further assessment. 2 No. from Co. Carlow and 1 No. from County Kilkenny. The effects of the Proposed Project on the character and physical fabric of these LCAs were comprehensively assessed in Appendix 14-2, including potential for cumulative effects. Landscape Effects on the Killshin Hills LCA are deemed to be 'Moderate' where the Proposed Project will materially alter the LCA. Effects on other LCAs were deemed to be 'Slight' and 'Not Significant'. Effects on landscape character from the other LCAs only relate to impacts on perceptual and aesthetic qualities.

Baseline investigations identified a total of 122 No. visual receptors in the LVIA Study Area. This included 39 No. designated Scenic Routes and Views, 1 No. OSi Viewing Areas, 27 No. settlements, 22 No. recreational, tourism and heritage destinations and recreational routes (i.e. walking trails), and 33 No. regional- and national-level transport routes. A preliminary analysis using ZTV mapping and on site visibility appraisals excluded most receptors from assessment due to either no or very limited visibility. 34 No. visual receptors were included for further assessment and are represented by the 15 No. selected photomontage viewpoints and 20 No. photowire viewpoints.

On-site visibility appraisals, ZTV mapping, a RSA and assessment of over 35 no. viewpoint locations (15 No. in the EIAR Volume 2: Photomontage Booklet and 20 No. in Appendix 14-5) determined that visibility of the Proposed turbines will be very limited from locations beyond 5 km to the north, south and west from the Proposed turbines, and distant open visibility occurs from the lowlands to the east. Therefore, the focus of assessment of visual effects on visual receptors was concentrated to sensitive receptors within 5km of the site and receptors to the east.

Photomontages were used to illustrate the assessment of the visual effects arising as a result of the Proposed Project from 15 No. viewpoint locations. The likely significant visual effects from each viewpoint are comprehensively addressed in Appendix 14-3, including assessment of cumulative effects. The assessment concluded that no 'Profound', 'Very Significant' or 'Significant' effects occurred at any of the 15 viewpoints. Residual effects of 'Moderate' occurred at 7 of the 15 viewpoints. A residual effect of 'slight' was deemed to arise at 4 of the 15 No viewpoints. All other viewpoints were assessed as resulting in 'Not Significant' (4) or 'Imperceptible' (0) residual visual effects.

The greatest potential for significant visual effects are likely to occur from receptors in close proximity to the site. 15 No. viewpoints (7 photomontages, 8 photowires) were captured within 5km of the Proposed turbines to address effects on residential receptors surrounding the site, as well as several designated scenic routes and protected views in proximity. 8 No. photowires were produced within 5km and show locations where very limited visibility of the Proposed turbines occur and there will be no impact on the receptors they represent. Designated Co. Carlow scenic routes 6, 7, 8, 9 are all located along the local road network surrounding the site, as well as Co. Carlow protected views 31 and 32. The impact assessment of these scenic designations were guided by the assessment of representative photomontage viewpoints (VP1, VP14, VP15) and several photowire viewpoints. The photomontages and the impact assessments (see Discussion in Section.14.7.3.2.2 in Chapter 14) determined that the Proposed Project will not significantly impact on the key scenic or landscape sensitivities of these designated scenic amenities. Residual visual effects on these receptors, accounting for cumulative effects, were deemed to be 'Moderate'.

Cumulative effects on landscape character are included in the impact assessment outlined in Appendix 14-2. Cumulative visual effects are also discussed and summarised in Appendix 14-3 and above in this Chapter. As demonstrated by the mapping and photomontage visualisations there is an accumulation of existing and permitted wind energy developments in the Killeshin Hills. The cumulative photomontages in the Volume 2 Booklet illustrate the nature and extent of potential cumulative visual

effects which are likely to occur on specific visual receptors and the differing geographic perspectives surrounding the site. This LVIA has determined that the undulating and well-defined landform features and highly dense levels of vegetation in this area have the potential to reduce the extent of cumulative visual effects experienced by visual receptors in this area and that it has the capacity to absorb multiple wind energy developments in combination with the Proposed Project.

From a Landscape and Visual perspective, the Proposed Project is an appropriately designed development and suitably scaled, sited in a suitable landscape for wind energy development with no potential significant effects on key landscape and visual sensitivities within the LVIA Study Area.

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1.15 Material Assets

Traffic and Transport

Introduction

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

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

The Proposed Project will take 18-24 months to construct the proposed 7 turbine wind farm, the Proposed Grid Connection Route linking to the existing Kilkenny substation, and associated development, during which all turbine components and all other associated materials will be transported to the site.

Traffic Route & Study Area

The Proposed Wind Farm is located in County Carlow, while the Proposed Grid Connection Route is located in Counties Carlow and Kilkenny. A short section of temporary link road is proposed to bypass the existing N78 / L-1834 junction to facilitate the delivery of the abnormally sized turbine components, which is located in County Kilkenny.

The delivery route to the site for the abnormally sized loads transporting the large turbine components commences at Belview Port in Waterford City. From Belview Port the route travels north on the N29 for approximately 4kms before heading west on the N25 for approximately 6 kms. The route then turns off the N25 at the Grannagh Roundabout to access the N9 heading west for a further 0.8 kms to the Quarry Roundabout that connects with the M9. From the Quarry Roundabout the route heads north on the M9 for approximately 100 kms exiting at Junction 3 onto the N78. From this point the route travels west on the N78 for approximately 33kms passing through the town of Athy and the villages of Ballylynan and Crettyard to the junction with the L-1834, where it is proposed that a temporary access road will connect the two roads to facilitate the abnormally sized vehicles. From this point the route travels south on the L-1834 for approximately 2kms and a further 5kms as the road links with the L-1835, and finally for a further 3kms on the L-3037 to the location of an existing agricultural access which is the location of the proposed access to the proposed Wind Farm site.

The construction and operational entrance for all traffic generated by the Proposed Wind Farm, including the abnormally sized loads, will be via a proposed access junction off the L-3037 in the townland of Ridge, located approximately 10km south of the L-1834 junction with the N78.

A crossroads type junction is also proposed on the L-30372 to serve as a crossing point for construction traffic crossing from the southern part of the Proposed Wind Farm site to the northern section. During

the construction phase the junction will provide for construction vehicles crossing the L-30372 only and there will be no construction traffic permitted to access the site via the L-30372. Once operational it is proposed that occasional maintenance car and light goods vehicle trips will be permitted to access the northern and southern parts of the site via the L-30372.

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The Proposed Grid Connection Route connects to the existing Kilkenny 110kV Substation, located in the townland of Scart. The Proposed Grid Connection Route measures approximately 20.1km, of which approximately 2km is located in County Carlow, and 18.1km traversing the road network in County Kilkenny.

Vehicle types and network geometry

The types of vehicles that will be required to negotiate the local network will be up to 83.5 metres long and will carry a blade 77.5 metres in length.

An assessment of the geometric requirements of the delivery vehicles was undertaken on the delivery route. Locations where it was established that the existing road geometry will not accommodate all of the vehicles associated with the Proposed Project are highlighted, with the extent of remedial works identified. In addition to the assessment presented, it is recommended that a dry run is undertaken by the transport company to check vertical and horizontal clearance on the transport route prior to construction.

Traffic impact on local network

During the 7 days when the concrete foundations are poured, the effect on the surrounding road network will be negative. If approaching the Proposed Wind Farm site from the north, it is forecast that the increase in traffic volumes will range from +10.4% on the N78, to +46.7% on the L-1834. If approaching from the south it is forecast that traffic flows on the R448 will increase by 4.9% and on the L-3037 travelling towards the Proposed Wind Farm site access by 16.2%. This will have a temporary negative effect on the delivery route with the impact forecast to be slight in terms of severity.

For 350 days when the general construction and groundworks are undertaken an additional 196 PCUs will travel to/from the Proposed Project. On these days it is forecast that the increase in traffic volumes will range from +4.5% on the N78 eastern arm from the direction of Athy, to +20.2% on the L-1834 between the N78 and the Proposed Wind Farm site access if accessing the Proposed Wind Farm site from the north. If approaching from the south it is forecast that traffic flows on the R448 just north of Leighlinbridge will increase by 2.1% and on the L-3037 travelling towards the site access by 7.0%. This will have a temporary negative effect on the delivery route with the impact forecast to be slight.

During the 22 days when the various component parts of the wind turbine plant are delivered to the Proposed Wind Farm site using extended articulated HGVs, the effect of the additional traffic on these days will be slight to moderate along the Proposed TDR due to the size of vehicles involved, resulting in increased traffic volumes ranging from +2.4% on the N78 from the direction of Athy, to +10.8% on the L-1834 between the N78 and the Proposed Wind Farm site access. It is forecast that there will be a negative temporary, slight effect on traffic flows if the delivery of the abnormally sized loads is undertaken at night, as is proposed.

During the 7 days of the turbine construction stage when general materials are delivered to the Proposed Wind Farm site, it is forecast that the increase in traffic volumes on these days will range from 1.5% on the N78 from the direction of Athy, to +6.6% on the L-1834 between the N78 and the proposed site access. This will have a temporary imperceptible negative effect on the N78, and temporary slight negative effect on the L-1834 leading to the Proposed Wind Farm site access.

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

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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.

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

One telecommunications link was identified by ENET in the northwest corner of the Proposed Wind Farm site that will be affected by T01 of the Proposed Wind Farm. Following identification of this, the Applicant (EDF Renewables Ireland Ltd.) and ENET have been in discussions regarding a mitigation plan for this link prior to the construction of the Proposed Wind Farm. ENET will decommission the existing link and build 2 no. new core wireless link with no overlap with the Proposed Wind Farm. The Applicant has agreed to the mitigation plan set out by ENET in Section 15.2.4.2 and following its implementation there will be no significant effect on Telecommunications as a result of the Proposed Project.

The nearest operational airport is Kilkenny Airport located approx. 20km southwest of the Proposed Wind Farm and the nearest operational airfield is Kilrush Airfield which is located approx. 36km northeast of the Proposed Wind Farm. The closest large international airport is Dublin Airport which is located over 90km northeast of the Proposed Wind Farm. Both airports listed above are outside the range at which such issues would be expected, and as detailed in Table 15-26, the Irish Aviation Authority (IAA) noted no issues with the Proposed Project however they issued observations as discussed in Section 15.2.4.3. A scoping response was received from the Department of Defence (DoD) which identified that the Proposed Wind Farm lies within 3 Nautical Miles (NM) of the M9 which is identified as a critical low level route used by state aircraft on operational tasking's. This follows the guidance referenced in the Irish Air Corps (IAC) Position Paper.

Following scoping responses received by both the IAA and Department of Defence, an Aviation Impact Assessment was carried out and notes the that the Proposed Wind Farm will have a low impact on airspace, general aviation and the IAC Activity within Military Operating Area 3 (MOA3), and a moderate impact on the IAC 3NM Buffer Zone from Motorways.

However, as detailed in Section 15.2.5 in Chapter 15, the AIA identifies that aircrafts displaced 3NM from the motorway preclude any chance of flight with visual reference to it and recommends challenging the IAC position, as it is not envisioned that flight operations along this route would no longer be able to take place as a result of the Proposed Wind Farm. Similarly, the aviation industry is highly regulated and subject to numerous mandatory standards, checks and safety requirements, many of which are international in nature (ICAO) and requiring the issue of operating licences. When taking this into account, the effect of the Proposed Wind Farm on aviation is in reality less severe.

On the basis of industry mandatory standards, checks and safety requirements, and following the mitigation measures identified, there will be a negative, slight, long-term residual effect from the Proposed Project on aviation.

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

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considers waste management during the construction, operational and decommissioning phases of the Proposed Project.

There are no overhead electricity cables on the Proposed Wind Farm site. There are overhead electricity lines crossing the public road corridor in which the Proposed Grid Connection Route is located. However, no impacts on overhead electricity lines are likely to occur due to the nature of the underground cabling installation works.

There are no known existing underground electricity cables present on the Proposed Wind Farm site. There are existing underground electricity cables present along the Proposed Grid Connection Route, and in the vicinity of the Proposed Wind Farm. Damage of underground electricity cables during construction operations could potentially result in serious injury or death of site staff. The Proposed Project has been designed to avoid exisiting underground electricity cables.

The Proposed Grid Connection Route will not pass over any existing gas lines between the Proposed Wind Farm site and the Kilkenny 110kV substation.

There are no other known existing services (i.e. water supply, sewage, telecommunications) present on the Proposed Wind Farm site. There are existing services (i.e. water supply, sewage, telecommunications) present along the Proposed Grid Connection Route, and in the vicinity of the Proposed Wind Farm site.

The Proposed Project infrastructure has been designed to avoid identified services and utilities. Prior to commencement of construction of the Proposed Project the surveys will be repeated and updated, to ensure any new services and utilities will not be impacted by the Proposed Project. There will be no significant effect on existing built services and utilities as a result of the Proposed Project.

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 Project. Disposal of waste will be a last resort.

With regard to grid connection cabling routes, there is potential for cumulative effects of the Proposed Grid Connection Route in conjunction with other permitted and proposed projects. The construction of the Proposed Grid Connection Route would be subject to a Road Opening License, as would any other similar nearby grid connection works. The timing of these works would therefore be controlled by the road opening licensing process with the relevant Local Authority and would not overlap. It is also likely that the construction phases of these projects will not overlap with the construction phase of the Proposed Project. On this basis of the assessment above, the Proposed Project will have no impact on built services and waste management.

1.16 Major Accidents and Natural Disasters

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

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

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

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

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

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

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

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

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

1.17 Interactions

The preceding Chapters 5 to 16 of this EIAR identify the potential significant environmental effects that may occur in terms of Population and Human Health, Biodiversity (Flora and Fauna), Ornithology (Birds), Land, Soils and Geology, Water (Hydrology and Hydrogeology), Air Quality, Climate, Noise and Vibration, Cultural Heritage (Archaeological, Architectural and Cultural Heritage), Landscape and Visual, Material Assets (Roads and Traffic, Telecommunications, Aviation, Utilities and Waste Management), and Major Accidents and Natural Disasters as a result of the Proposed Project, as described in Chapter 4 of this EIAR. All of the potential significant effects of the Proposed Project and the measures proposed to mitigate them have been outlined in the preceding chapters of this EIAR. Mitigation measures and best practice measures for the construction, operation and decommissioning of the Proposed Project are detailed in the accompanying Construction and Environmental Management Plan (CEMP). However, for any development with the potential for significant environmental effects there is also the potential for interaction between these potential significant effects. The result of interactive effects may exacerbate the magnitude of the effects or ameliorate them or have a neutral effect.

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

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

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