1. INTRODUCTION

1.1 Introduction

This Environmental Impact Assessment Report (EIAR) has been prepared by MKO on behalf of FuturEnergy Knockshanvo Designated Activity Company (the Applicant), who intend to apply to An Bord Pleanála (the Board) for planning permission under sections 37E and 182A of the Planning and Development Act 2000 (as amended) (the "PDA") to construct a wind energy development at Knockshanvo and adjacent townlands, located in County Clare. The proposed development is being brought forward in response to local, national, regional and European policy regarding Ireland's transition to a low carbon economy and associated climate change policy objectives.

The proposed wind energy development will comprise of 9 No. turbines with a limited tip height range of 179.5 metres to 185 metres and all associated foundations and hardstanding areas, access roads and entrance(s) including upgrade of existing site roads and provision of new roads, 110kV electrical substation and wind farm control building(s), underground cabling, borrow pit(s), electrical cabling for 110kV grid connection, amenity works, biodiversity enhancement areas, temporary construction compounds, a permanent meteorological mast, temporary transition compound and upgrades to roads along the turbine delivery route. A full description of the proposed development is available in Chapter 4 of this EIAR.

Due to the nature of the proposed wind energy development, which will have a potential generating capacity of greater than 50 megawatts (MW), the provision of 110kV grid infrastructure will be required. The 110kV grid infrastructure will form part of the national electricity transmission network. As such, two separate planning applications are required, as outlined below.

One planning application will be submitted to the Board under sections 37E of the PDA seeking permission for the proposed 9 No. wind turbines and associated infrastructure with a potential generating capacity of greater than 50 megawatts (MW). The application meets the threshold for wind energy set out in the Seventh Schedule of the PDA (being *'An installation for the harnessing of wind power for energy production (a wind farm) with more than 25 turbines or having a total output greater than 50 megawatts'*) and is therefore being submitted directly to the Board as a Strategic Infrastructure Development (SID) in accordance with Section 37E of the PDA. This approach has been confirmed following consultations with the Board under the provisions of Section 37B of the PDA (case reference ABP-319215-24). The planning application for the wind farm site will include the 110kV electrical substation and wind farm control buildings.

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

A second planning application will be submitted to the Board under sections 182A of the PDA seeking permission for the 110kV underground cabling to Ardnacrusha 110kV electrical substation and associated works under the provisions of Section 182A of the PDA ('*a high voltage line where the voltage would be 110 kilovolts or more,...'*. This approach has been confirmed following consultations with the Board under the provisions of Section 182E of the PDA (case reference ABP-317763-23).

The EIAR will assess all component parts of the proposed Knockshanvo Wind Farm development that will be submitted within the planning applications to the Board. All elements of the proposed development included as part of the planning applications will henceforth be referred to as the 'Proposed Development' throughout the EIAR. The planning applications are also accompanied by a Natura Impact Statement ('NIS').

1.2 Brief Description of the Proposed Development

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

The full description of the Proposed Development, as per the public planning notices, is as follows:

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

i. *Construction of 9 no. wind turbines with a blade tip height range from 179.5m to 185m inclusive, a hub height range from 102.5m to 110.5m inclusive and a rotor diameter range from 149m to 163m inclusive with associated foundations, hard-standing and assembly areas.*
ii. *Construction of 1 no. permanent 110 kV electrical substation including 2 no. control buildings, lightning protection, welfare facilities, car parking, and all associated electrical plant and apparatus, security fencing, external lighting, underground cabling, wastewater holding tank and all associated infrastructure, apparatus and landscaping;*
iii. *Underground electrical cabling (33kV) and communications cabling connecting the wind turbines to the proposed on-site 110kV electrical substation and associated ancillary works;*
iv. *Erection of 1 no. Meteorological Mast of 105 metres above existing ground level for the measuring of meteorological conditions, including a lightning rod which will extend above the mast ;*
v. *Construction of new permanent access roads and upgrade of existing roads to provide access within the site and to connect the wind turbines and associated infrastructure;*
vi. *Construction of 1 no. new permanent access to the site off the R465 regional road to serve as the sole entrance to the wind farm during its operational phase and to facilitate the delivery of the construction materials and turbine components to site during the construction, operational and decommissioning phases;*
vii. *Construction of 2 no. new permanent access points off the L-3042 and L-30144-0 local roads to facilitate traffic movement across the site during construction, operation and decommissioning phases. Both accesses will be gated and opened when required during the operational phase;*
viii. *Development of 5 no. borrow pits;*
ix. *Construction of 3 no. temporary construction compounds and associated ancillary infrastructure including temporary site offices, staff facilities and car-parking areas, all to be removed at end of construction phase;*
x. *Temporary works at 3 no. locations along the R465 regional road associated with the facilitation of turbine component and abnormal load delivery to site. These works will primarily include the trimming of vegetation and strengthening of road verges;*
xi. *Installation of a temporary transition compound to facilitate turbine blade delivery during the construction phase, within the townland of Court, Co. Limerick. The works will include installation of a temporary stone hard standing area and associated entrance and egress to and from the N69 national road and will be removed at the end of the construction phase.*
xii. *Permanent amenity works comprising the construction of 1 no. new marked trail, the development of 2 no. new viewing areas and upgrade to 1 no. existing viewing area, including the installation of associated signage and seating;*
xiii. *Permanent and temporary Site Drainage;*
xiv. *Operational Stage Site Signage;*
xv. *Ancillary forestry felling to facilitate construction and operation of the proposed development;*
xvi. *Biodiversity enhancement measures including the permanent clear-felling of land, and;*

xvii. *All related site works and ancillary development including landscaping considered necessary to facilitate the proposed development.*

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

An Bord Pleanála – Planning Notice Project Description – Grid Connection

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

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

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

The layout of the Proposed Development has been led by consideration of constraints and facilitators, thereby avoiding the environmentally sensitive parts of the site. For example, the roads layout for the Proposed Development maximises the use of the existing onsite access roads and tracks where possible, with approximately 3.36 kilometres of existing roadway/ tracks requiring upgrading and approximately 9.3 kilometres of new access road to be constructed. The Grid Connection is located predominately within existing forestry tracks and the public road corridor.

There are 15 no. sensitive receptors located within 1 kilometre of the proposed turbine layout. A minimum separation distance of 751m between sensitive receptors and the proposed wind turbines has been achieved with the project design. The Proposed Development is described in detail in Chapter 4 of this EIAR.

All elements of the overall project, including the Wind Farm Site, and Grid Connection have been assessed as part of this EIAR.

1.2.2 References to Proposed Development

For the purposes of this EIAR:

- Where the 'Proposed Development' is referred to, this relates to all the project components described in detail in Chapter 4 of this EIAR i.e. Wind Farm Site and Grid Connection as detailed below.
- 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. Generally, the study area extends beyond the planning application site boundary depending on the requirements of individual assessments. Individual topics for assessment purposes, i.e., each chapter, will indicate the study area used for that topic. The planning

application red line boundary occupies a smaller area within the primary EIAR Site Boundary. The EIAR Site Boundary represents the primary area of study and not necessarily areas where proposed works will occur as part of the Proposed Development.

- Where the 'Wind Farm Site' is referred to, this refers to turbines and associated foundations and hard-standing areas, meteorological mast, site entrance, junction accommodation works, access roads, temporary transition compound and upgrades to roads along the turbine delivery route, temporary construction compounds, temporary transition compound, 110kV electrical substation, underground cabling, borrow pits, site drainage, tree felling, amenity works, biodiversity enhancement areas and all ancillary works. The Wind Farm Site is shown in Figure 1-1a.
- Where 'Grid Connection' is referred to, this refers to the underground 110kV electrical cabling and all associated site development works connecting the Wind Farm Site to the existing Ardnacrusha 110kV electrical substation. The Grid Connection is shown in Figure 1-1b.

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

For clarity in this EIAR, all elements of the Proposed Development will be assessed cumulatively and in combination with other projects to aid the competent authority in carrying out an EIA. The methodology for the identification of projects with the potential for in combination effects is set out in detail in Chapter 2 Background of this EIAR.

The Proposed Development is described in detail in Chapter 4 of this EIAR.

1.2.3 Proposed Development Site Location

The Wind Farm Site is located approximately 3 km south of Broadford, 3.5 km southeast from Kilkishen, and 4 km northeast from Sixmilebridge, Co. Clare. The Grid Reference co-ordinates for the approximate centre of the site are E554266 N669733. The site is accessed via local roads from the R465 Regional Road, which travels in a north-south direction between Broadford and Ardnacrusha, the R471 Regional Road which travels east-west between Sixmilebridge and Clonlara and the Crag Local Road, which travels in a northeast-southwest direction between Sixmilebridge and Broadford. The Wind Farm Site itself is served by a number of existing forestry roads.

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

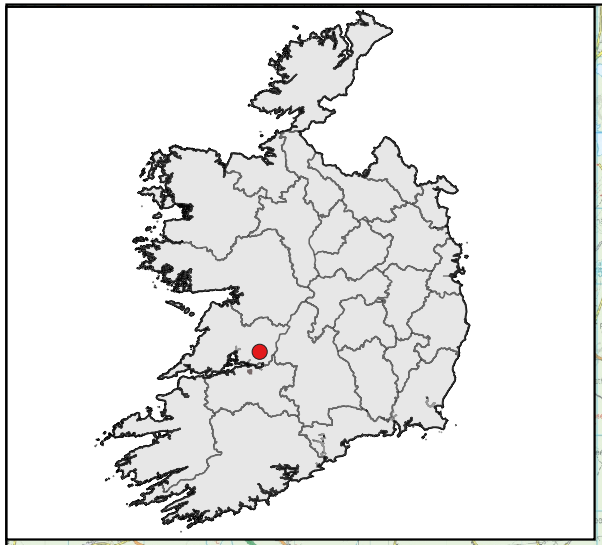
The Wind Farm Site is located within an area which is designated as a 'Strategic Area' for wind energy development (7 no. turbines) and within an area which is designated as 'Acceptable in Principle' (2 no. turbines) in the Wind Energy Strategy (WES) for County Clare which was published in 2017 to meet the policies and objectives of the Clare County Development Plan 2017-2023. The WES has been adopted as part of the Clare County Development Plan 2023 – 2029.

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

The townlands in which the Proposed Development is located are listed in Table 1-1.

Table 1-1 Townlands within which the Proposed Development is Located

Development Works	Townland
Wind Farm Site	
Wind Turbines and Associated Foundations and Hardstanding Areas, 110kV Electrical Substation, Permanent Meteorological Mast, Junction Accommodation Works, Access Roads, New Access, Underground Electrical Cabling, Temporary Construction Compounds, Borrow Pits, Site Drainage, Tree Felling, Biodiversity Enhancement, Temporary Transition Compound, Recreation & Amenity Areas, Operational Stage Site Signage and all ancillary works and apparatus.	Snaty (Massy), Hurdleston, Oatfield, Drumsillagh or Sallybank (Parker), Gortacullin, Aharinaghbeg, Knockshanvo, Cloontra, Cloghoolia, Ballycullen, Cloontra West, Formoyle More, Kilmore, Mountrice, Ballyvorgal South, Crag, Kyleglass, Court, Glenwood, Snaty (Cooper), Ballykelly, Muingboy, Drumsillagh or Sallybank (Merritt), Kyle, Belvoir, Snaty (Wilson) and Cloontra East.
Grid Connection	
Underground Cabling Route connecting to the existing Ardnacrusha 110kV electrical substation, Site Drainage, Tree Felling and all ancillary works and apparatus.	Lakyle, Knockdonagh, Castlebank, Cloghera, Roo West, Drumsillagh or Sallybank (Merritt), Glenlon South, Trough, Drumsillagh or Sallybank (Parker) and Ballykeelaun.



Map Legend

- EIAR Site Boundary
- Site Location

Drawing Title

EIAR Site Location

Project Title	
Knockshanvo Wind Farm	
Drawn By: SD	Checked By: EOS
Project No.: 200513	Drawing No.: Figure 1-1
Scale: 1:100,000	Date: 2024-08-09

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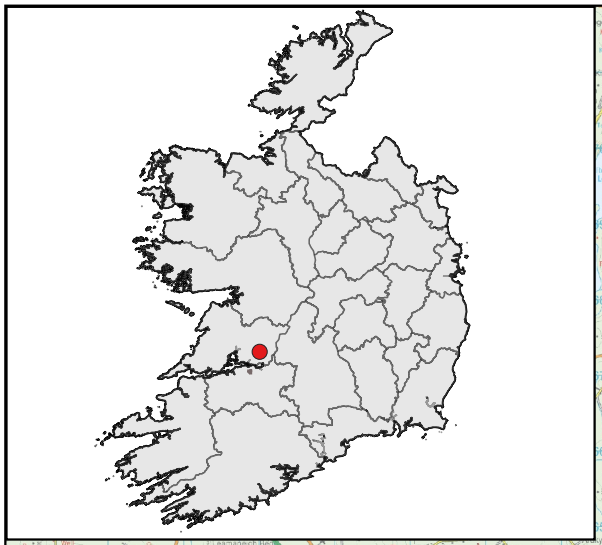

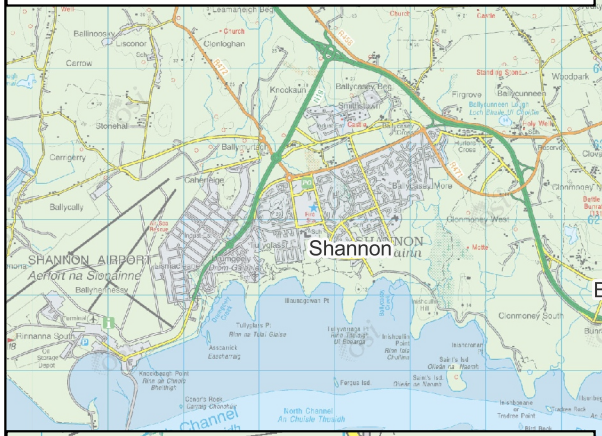

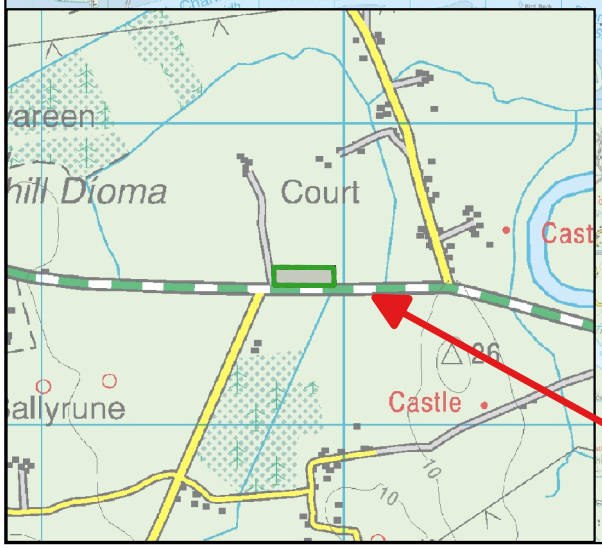

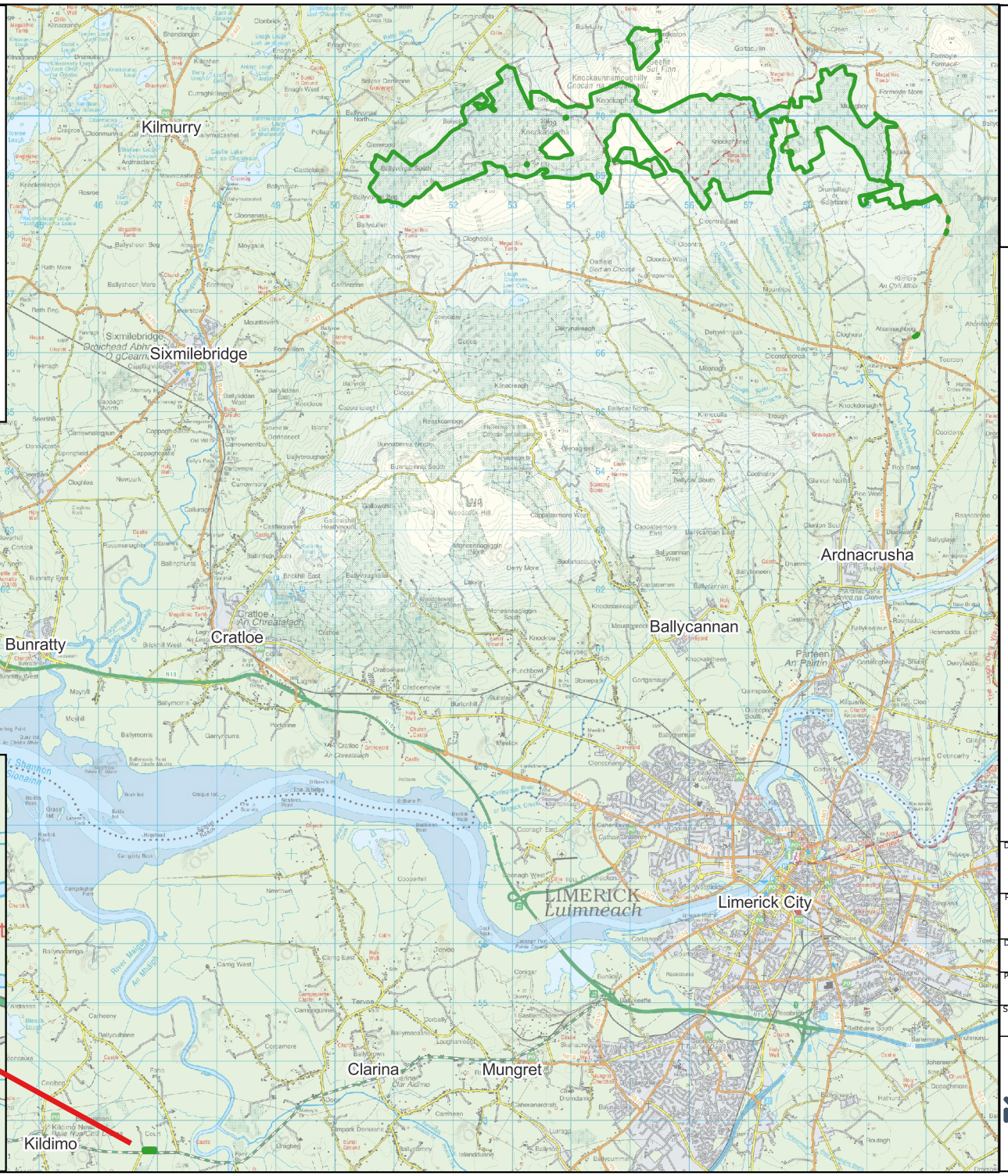

Map Legend

- Wind Farm Site
- Site Location

Drawing Title
Wind Farm Site Location

Project Title
Knockshanvo Wind Farm

Drawn By	Checked By
SD	EOS
Project No.	Drawing No.
200513	Figure 1-1a
Scale	Date
1:100,000	2024-08-09

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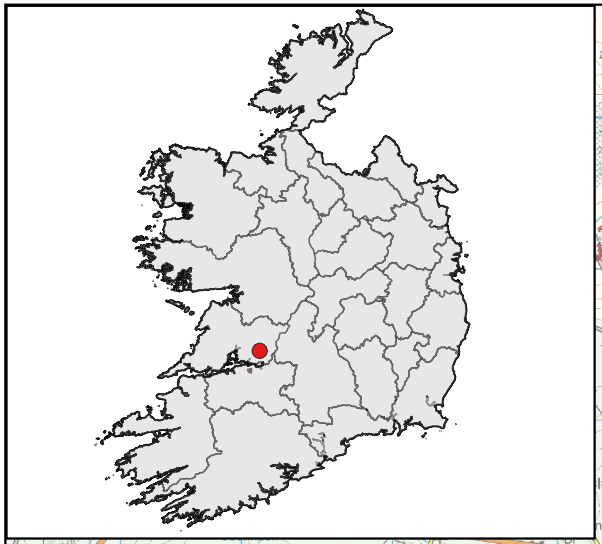

Map Legend

- Grid Connection
- Site Location

Drawing Title

Grid Connection Location

Project Title

Knockshanvo Wind Farm

Drawn By	Checked By
SD	EOS
Project No.	**Drawing No.**
200513	Figure 1-1b
Scale	**Date**
1:50,000	2024-08-09

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1.3 Legislative Context

1.3.1 Strategic Infrastructure Development

In relation to projects that may be deemed to be Strategic Infrastructure Development (SID), Part 1 of the Seventh Schedule of the PDA, specifies, inter alia, the following classes of development:

> *"An installation for the harnessing of wind power for energy production (a wind farm) with more than 25 turbines or having a total output greater than 50 megawatts."*

Once an SID determination request is made by a prospective applicant, the Board must satisfy itself that the proposed development meets one or more of the conditions set out in section 37A(2) of the PDA, namely—

> *"(a) the development would be of strategic economic or social importance to the State or the region in which it would be situate,*
>
> *(b) the development would contribute substantially to the fulfilment of any of the objectives in the National Spatial Strategy or in any regional spatial and economic strategy in force in respect of the area or areas in which it would be situate,*
>
> *(c) the development would have a significant effect on the area of more than one planning authority."*

Development for the purposes of electricity transmission falls within the scope of Section 182A(1) of the PDA. The definition of electricity transmission as set out in Subsection 9 of Section 182A is as follows:

> *"In this section 'transmission' in relation to electricity, shall be construed in accordance with section 2(1) of the Electricity Regulation Act 1999 but, for the purposes of this section, the foregoing expression, in relation to electricity, shall also be construed as meaning the transport of electricity by means of*
>
> > *(a) a high voltage line where the voltage would be 110 kilovolts or more, or*
> >
> > *(b) an interconnector, whether ownership of the interconnector will be vested in the undertaker or not."*

Section 2(1) of the Electricity Regulation Act 1999 defines "transmission" in relation to electricity as follows (emphasis added):

> *"The transport of electricity by means of a transmission system, that is to say a system which consists, wholly or mainly, of high voltage lines and electric plant and which is used for conveying electricity from a generating station to a substation, from one generating station to another, from one substation to another or to or from any interconnector or to final customers, but shall not include any such lines which the Board may, from time to time, with the approval of the Commission, specify as being part of the distribution system, but shall include any interconnector owned by the Board."*

Distribution is defined as

> *"The transport of electricity by means of a distribution system, that is to say, a system which consists of electric lines, electric plant, transformers and switch gear and which is used for conveying electricity to final customers."*

Electric plant is defined as:

"any plant, apparatus or appliance used for, or for the purposes connected with, the generation, transmission, distribution or supply of electricity other than –

(a) An electric line

(b) a meter used for ascertaining the

(c) quantity of electricity supplied to any premises, or (c) an electrical applicant under the control of a consumer".

Background

On the 14th of February 2023, the Applicant sought a determination, from the Board, in relation to the SID status or otherwise, of a proposed wind farm development at Knockshanvo, County Clare. This request was made in accordance with Section 37B of the PDA (Pl.05E.305388).

A pre-application consultation meeting between the Board and representatives of the Applicant and MKO, in relation to the Proposed Development took place on the 4th May 2023. At the meeting MKO presented the various background information with regards to the Proposed Development and development site. Further discussions were also had with regards to ecology, ornithology, peat stability, landscape and visual and aviation.

A formal closure request was made on the 10th October 2023, and the Board issued a notice to the Applicant indicating its determination that the Proposed Development is SID on the 15th November 2023 and, accordingly, an application for permission should be made directly to the Board in accordance with Section 37E of the PDA.

A second pre-application consultation was undertaken and included a meeting between the Board and representatives of the Applicant and MKO, on the 4th April 2024 (case reference ABP-319215-24). The second meeting was necessitated by a wish on the part of the Applicant to obtain a design flexibility opinion from the Board in accordance with the recently commenced (S.I No. 645 of 2023) legislative provisions relating to design flexibility introduced by the Planning and Development, Maritime and Valuation (Amendment) Act 2022. At the meeting MKO presented the various background information with regards to the Proposed Development and development site. Further discussions were also had with regards to ecology, ornithology, landscape and visual, aviation and cumulative assessment.

A second meeting took place on the 4th April 2024 between the Board and representatives of the Applicant and MKO (case reference ABP-319151-24). At this meeting the Applicant engaged with the Board under the provisions of Section 37CC of the PDA which relate to design flexibility introduced by the Planning and Development, Maritime and Valuation (Amendment) Act 2022. At the meeting MKO listed the unconfirmed details in which the Applicant is requesting design flexibility on as follows:

- A total tip height in the range of (and including) 179.5 metres minimum to 185 metres maximum,
- A hub height in the range of (and including) 102.5 metres minimum to 110.5 metres maximum,
- A rotor diameter in the range of (and including) 149 metres minimum to 163 metres.
- Maximum Export Capacity (MEC) of between 5.7 MW and 7.2 MW per turbine.

A formal closure request was made on the 29th April 2024, and the Board issued a notice to the Applicant indicating its determination that the Proposed Development is SID on the 21st May 2024 and, accordingly, an application for permission should be made directly to the Board in accordance with Section 37E of the PDA. This application is being made on the basis of this determination (case reference ABP-319215-24).

The Board also issued an opinion on the 21st May 2024, on the details that can be confirmed by the Applicant at a later stage. The Board determined that due to the specific circumstances of the development, it is satisfied that the proposed application can be made and decided before certain details of the application are confirmed. The certain details include the following:

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

The Board considered that export capacity is consequent of turbine design and is not a physical attribute on which it is possible to measure or assess impact.

The Applicant also engaged with the Board under the provisions of Section 182E of the PDA, as to whether the Grid Connection element of the Proposed Development would be considered SID.

A SID meeting under the provisions of Section 182E was held with the Board on the 6th October 2023. At the meeting MKO presented the various options considered for a 110kV grid connection and presented Option 5 which is an underground grid connection from the onsite 110kV substation to Ardnacrusha 110kV substation as the preferred option. A further discussion was had regarding regulation Statutory Instrument No. 383 of 2023 Planning And Development (Amendment) (No. 2) Regulations 2023 which came into force on 24th July 2023 and its applicability to the Proposed Development.

A formal closure request was made on the 5th December 2023, and the Board issued a notice to the Applicant indicating its determination that the Proposed Development is SID on the 18th January 2024 and, accordingly, an application for permission should be made directly to the Board in accordance with Section 182A of the PDA.

1.3.2 Environmental Impact Assessment

The consolidated European Union Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, is transposed into Irish planning legislation by the Planning and Development Act 2000 (as amended) (the 'Planning Act') and the Planning and Development Regulations 2001 (as amended) (the 'Planning Regulations'). Directive 2011/92/EU was amended by Directive 2014/52/EU (the 'EIA Directive') which has been transposed into Irish law with the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018).

The EIA Directive requires Member States to ensure that a competent authority carries out an assessment of the likely significant effects of certain types of project, as listed in the Directive, prior to development consent being given for the project.

The Environmental Impact Assessment (EIA) of the Proposed Development will be undertaken by An Bord Pleanála, as the competent authority.

This EIAR complies with the EIA Directive in terms of the structure and content of the information required.

Article 5 of the EIA Directive provides where an EIA is required, the developer shall prepare and submit an EIAR previously referred to as an Environmental Impact Statement ('EIS'). The information to be provided by the developer shall include at least:

a) *a description of the project comprising information on the site, design, size and other relevant features of the project;*
b) *a description of the likely significant effects of the project on the environment;*

c) *a description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;*
d) *a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;*
e) *a non-technical summary of the information referred to in points (a) to (d); and*
f) *any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected.*

In addition, Article 94 of the Planning Regulations sets out the information to be contained in an EIAR, with which this EIAR complies.

MKO was appointed as environmental consultant on the Proposed Development and commissioned to prepare this EIAR in accordance with the requirements of the EIA Directive.

Part 2 of Schedule 5 of the Planning Regulations, as amended, identifies classes and scales of development that require Environmental Impact Assessment (EIA). The relevant class of development in this case relates to "installations for the harnessing of wind power for energy production (wind farms) with more than 5 turbines or having a total output greater than 5 megawatts", as per Item 3(i) of the Schedule. The Proposed Development exceeds 5 Megawatts in scale and proposes more than 5 turbines, and therefore is subject to EIA.

The EIAR provides information on the receiving environment and assesses the likely significant effects of the Proposed Development on it and proposes mitigation measures to avoid or reduce these effects. The function of the EIAR is to provide information to allow the competent authority to conduct the EIA of the Proposed Development.

All elements of the Proposed Development as detailed in Section 1.2 above have been assessed as part of this EIAR.

1.3.3 EIAR Guidance

The Environmental Protection Agency (EPA) published its *'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports'* in May 2022, which is intended to guide practitioners preparing an EIAR in line with the requirements set out in the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018).

In preparing this EIAR regard has also been taken of the provisions of the '*Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment*', published by the Department of Housing, Planning and Local Government (DHPLG) in August 2018 to the extent these guidelines are relevant having regard to the enactment of the revised EIA Directive.

The European Commission also published a number of guidance documents in December 2017 in relation to Environmental Impact Assessment of Projects (Directive 2011/92/EU as amended by 2014/52/EU) including '*Guidance on Screening*', '*Guidance on Scoping*' and '*Guidance on the preparation of the Environmental Impact Assessment Report*'. MKO has prepared the EIAR in accordance with these guidelines also.

1.3.4 Wind Energy Development Guidelines for Planning Authorities

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

The '*Wind Energy Development Guidelines for Planning Authorities'* (DoEHLG, 2006) were the subject of a targeted review. The proposed changes to the assessment of impacts associated with onshore wind energy developments were outlined in the document *'Proposed Revisions to Wind Energy Development Guidelines 2006 – Targeted Review'* (December 2013), the '*Review of the Wind Energy Development Guidelines 2006 – Preferred Draft Approach'* (June 2017) , and the Draft Wind Energy Development Guidelines, December 2019 (the draft Guidelines). A consultation process in relation to the draft Guidelines closed on 19th February 2020. The proposed changes presented in the draft Guidelines give certain focus on the setback distance from residential properties (four times the proposed maximum tip height), along with shadow flicker and noise requirements relative to sensitive receptors and under grounding grid connections.

At time of writing, the draft Guidelines have not yet been adopted, and the relevant guidelines for the purposes of section 28 of the Planning and Development Act 2000, as amended, remain those issued in 2006. Notwithstanding this, however, due to the timelines associated with the planning process for renewable energy projects and the commitment within the Climate Action Plan 2024 to publish new draft guidelines in 2023 and final guidelines in 2024 (refer to Section 1.5.1.1 below), it is possible that the draft Guidelines are adopted during the consideration period for the current Proposed Development. In consideration of the draft Guidelines being adopted in advance of a planning decision being made on the Proposed Development, it is noted that the proposed four times turbine tip height distance from proposed turbines to third party sensitive receptors has been achieved. In addition, any revised noise and shadow flicker requirements can be achieved by implementing mitigation through use of the turbine control systems.

1.4 The Applicant

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

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

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

1.5 Need for the Proposed Development

1.5.1 Overview

In July 2021, the Climate Action and Low Carbon Development (Amendment) Act 2021 was signed into law, committing Ireland to reach a legally binding target of net-zero emissions no later than 2050, and a cut of 51% by 2030 (compared to 2018 levels). On this pathway to decarbonisation, the Government published the Climate Action Plan 2024[1] reaffirming the renewable electricity target of 80% by 2030, without compromising security of energy supply. The Proposed Development is expected to be operational before 2030 and would therefore contribute to this 2030 target.

The document titled 'Ireland's Greenhouse Gas Emissions Projections 2022-2040' published by the EPA in June 2023, provides an in-depth analysis and projections of greenhouse gas emissions in Ireland from 2022 to 2040.

In relation to the sectoral emissions ceilings for the first two carbon budget periods, the report notes that:

- Sectoral emissions ceilings for 2025 and 2030 are projected to be exceeded in almost all cases, including Agriculture, Electricity, Industry, and Transport (Page 4).
- For the first budget period (2021-2025), the projected emissions from the electricity sector are 45.2 Mt CO_2 eq, while the sectoral ceiling is set at 40 Mt CO_2 eq.
- For the second budget period (2026-2030), the projected emissions are 28.2 Mt CO_2 eq, with a sectoral ceiling of 20 Mt CO_2 eq (Page 14).

In percentage terms, the largest sectoral ceiling exceedances projected are for Industry and Electricity in the second budget period.

In July 2023, the EPA published 'Irelands Provisional Greenhouse Gas Emissions 1990-2022[2] which stated a provisional total of national greenhouse gas emissions for 2022 to be 60.76 million tonnes carbon dioxide equivalent ($MtCO_2eq$) which is 1.9% lower (or 1.19 $MtCO_2eq$) than emissions in 2021 (61.95 $MtCO_2eq$) and follows a 5.1% increase in emissions reported for 2021; emissions are 0.5% lower than pre-pandemic 2019 figures. In 2022, the energy industries, transport and agriculture sectors accounted for 74.1% of total greenhouse gas (GHG) emissions. Agriculture is the single largest contributor to the overall emissions, at 38.4%. Transport, energy industries and the residential sector are the next largest contributors, at 19.1%, 16.6% and 10.0%, respectively. The report further states that there was a substantial reduction in coal, oil and peat used in electricity generation (-16%, -29% and -25% respectively), and renewable energy usage increased from 35% in 2021 to 39% in 2022. The report highlights that whilst emissions are beginning to reduce, transformative measures will be needed to meet National Climate ambitions.

The '*National Energy Projections 2023*[3], published annually by the Sustainable Energy Authority of Ireland (SEAI), state that in 2022, 86% of all energy used in Ireland was from fossil fuels, 13% from renewable sources and the remainder from others such as waste and electricity imports. By 2030, fossil fuels could still provide most of Ireland's energy, ranging from 68% in the WEM scenario to 57% in the most ambitious WAM scenario. The deployment of renewables needs to outpace the growth of energy demand for the absolute reductions in greenhouse gas emissions that are required to be met. However, the SEAI National Energy Projections show that by the end of the second budget period i.e. 2030, the total exceedance in the electricity sector is projected to be 20.1 $MtCO_2eq$, or 33%, and 13.8$MtCO_2eq$, or 23%, in the WEM and WAM scenarios, respectively.

[1] *Department of Environment, Climate and Communications (2023) Climate Action Plan 2024*
[2] *Ireland's Provisional Greenhouse Gas Emissions (1990-2022)* <*https://www.epa.ie/publications/monitoring–assessment/climate-change/air-emissions/2023-EPA-Provisional-GHG-Report_Final_v3.pdf*>
[3] *SEAI National Energy Projections 2023 Report.* <*https://www.seai.ie/publications/National-Energy-Projections-2023.pdf*>

As such, the Proposed Development is critical to helping Ireland address these challenges as well as addressing the country's over-dependence on imported fossil fuels. The need for the Proposed Development is driven by the following factors:

1. *A legal commitment from Ireland to limit greenhouse gas emissions under the Kyoto protocol to reduce global warming;*
2. *A requirement to increase Ireland's national energy security as set out in Ireland's Transition to a Low Carbon Energy Future 2015-2030;*
3. *Climate Action Plan 2024 which aims to ensure that Ireland achieves its legally binding target (the Climate Action and Low Carbon Development (Amendment) Act 2021) of net-zero greenhouse gas emissions no later than 2050, and a reduction of 51% by 2030*
4. *Increasing energy price stability in Ireland through reducing an over reliance on imported fossil fuels*
5. *Provision of cost-effective power production for Ireland which would deliver local benefits; and*
6. *To facilitate the Government in meeting its ambitious 80% renewable energy target by 2030.*

These factors are addressed in further detail below. Section 2.3 in Chapter 2 of this EIAR on Background to the Proposed Development, presents a full description of the international and national renewable energy policy context for the project. Section 2.2 also addresses climate change, including Ireland's current status with regard to meeting greenhouse gas emission reduction targets.

The Board in determining the proper planning and sustainable development of the area must by virtue of Section 17(1) of the Climate Act 2021 perform its functions in a manner consistent with, amongst other things, the furtherance of the national climate objective and the most recent Climate Action Plan in so far as practicable. (In so far as practicable is not a relaxation on this requirement but rather imposes on the Board a mandatory obligation to act consistently as far as is practicably possible.) Thus significant weight must be given to the requirements of the latest Climate Action Plan and the targets set out within same for the deployment of wind energy development within the state. As stated above, this is particularly critical at a time when the national climate objective and the CAP targets are in jeopardy according to leading body experts."

1.5.1.1 Climate Change and Greenhouse Gas Emissions

Although variation in climate is thought to be a natural process, the rate at which the climate is changing has been accelerated rapidly by human activities. Climate change is one of the most challenging global issues facing us today and is primarily the result of increased levels of greenhouse gases in the atmosphere. 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.

Globally, governance relating to climate change has changed significantly since 1994 when the United Nations Framework Convention on Climate Change (UNFCCC) entered into force. Greenhouse Gas emissions have been a primary focus of climate related international agreements for almost two decades. At the Paris Conference of the Parties (COP) climate meeting (COP21) in December 2015, 195 countries adopted the first-ever universal, legally binding global climate deal. The agreement sets out a global action plan to avoid dangerous climate change by limiting global warming to well below 2°C above pre-industrial levels. Under the agreement, Governments also agreed on the need for global emissions to peak as soon as possible, recognising that this will take longer for developing countries and to undertake rapid reductions thereafter in accordance with the best available science. The most recent COP (COP28) took place in Dubai in December 2023. COP28 resulted in a landmark deal to 'transition away' from fossil fuels, the United Arab Emirates (UAE) Consensus. The agreement calls for 'transitioning away from fossil fuels in energy systems, in a just, orderly, and equitable manner.' This is the first time in 28 years that fossil fuels have been mentioned in a COP outcome. The UAE Consensus also calls for more explicit near-term goals in the lead up to 2050, calling for the world to cut greenhouse gas emissions by 43% by 2030 as compared to 2019 levels. COP28 concluded the first ever

Global Stocktake under the Paris Agreement. The Global Stocktake recognises that the world is not on track to meet 1.5°C and will require Parties to align their national targets and measures with the Paris Agreement. Parties have two years to submit their Nationally Determined Contributions for 2035, these need to be aligned with the best available science and the outcomes of the Global Stocktake.

In 2014 the International Panel on Climate Change (IPCC) put forward its clear assessment in their Fifth Assessment Report[4], that the window for action on climate change is rapidly closing and that renewable energy sources such as wind will have to grow from 30% of global electricity at present to 80% by 2050 if we are to limit global warming in accordance with the COP21 agreement, i.e., to limit global warming to well below 2°C above pre-industrial levels. Former Minister Kelly remarked in 2015 that "*As a nation we must do everything in our power to curb our emissions*".

In February 2022, the IPCC released the report 'Working Group II-Climate Change 2022: Impacts, Adaptation and Vulnerability' regarding the impacts of climate change on nature and human activity. The report states that global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in CO_2 and other greenhouse gas emissions occur in the coming decades. The report identifies four key risks for Europe with most becoming more severe at 2°C global warming levels (GWL) compared with 1.5 °C GWL. From 3°C GWL, severe risks remain for many sectors in Europe. The four key risks identified are:

- Key Risk 1: Mortality and morbidity of people and changes in ecosystems due to heat;
- Key Risk 2: Heat and drought stress on crops;
- Key Risk 3: Water scarcity;
- Key Risk 4: Flooding and sea level rise.

In April 2022, the IPCC released the report 'Working Group-III – Climate Change 2022: Mitigation Of Climate Change', which assesses literature on the scientific, technological, environmental, economic and social aspects of mitigation of climate change. The report reflects new findings in the relevant literature and builds on previous IPCC reports, including the WGIII contribution to the IPCC's Fifth Assessment Report (AR5) and the WGI and WGII contributions to AR6 and the three Special Reports[5] in the Sixth Assessment cycle. This report outlines developments in emission reduction and mitigation efforts, assessing the impact of national climate pledges in relation to long-term emissions goals in a global context.; and states that '*Unless there are immediate and deep emissions reductions across all sectors, limiting global warming to 1.5°C will be beyond reach.*'

In June 2023, the EPA published '*Ireland's Greenhouse Gas Emissions Projections 2022-2040*'[6] which states that, for 2021, the energy sector contributed to 17% of Ireland's total emissions. Under a With Existing Measures (WEM) scenario, emissions from the energy industries sector are projected to decrease by 50% from 10.3 to 5.2 $MtCO_2eq$; under a With Additional Measures (WAM) scenario, emissions from the energy sector are projected to decrease by 60% from 10.3 to 4.2 $MtCO_2eq$ over the period 2021-2030. In this scenario it is assumed that by 2030 renewable electricity share increases to at least 80% (as set out in the Climate Action Plan 2024).

The EPA '*Ireland's Provisional Greenhouse Gas Emissions 1990-2022*' report stated that in 2022, overall electricity generation in Ireland increased by a 2.1% and renewable electricity generation

[4] IPCC Fifth Assessment Synthesis Report, Intergovernmental Panel on Climate Change AR5 Report

[5] *The three Special Reports are: Global Warming of 1.5°C: an IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty (2018); Climate Change and Land: an IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems (2019); IPCC Special Report on the Ocean and Cryosphere in a Changing Climate (2019)*

[6] *Ireland's Greenhouse Gas Emission Projections 2022-2040* <https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/EPA-GHG-Projections-2022-2040_Finalv2.pdf>

increased from 35% in 2021 to 38.6%, mainly due to an increase in wind energy production of 14.6%. The increase in renewables, combined with decreases in coal, oil, and peat use, resulted in the emissions intensity of power generation in 2022 decreasing by 4.8% to, 331 g CO_2/kWh, as compared with 348 g CO_2/kWh in 2021. Renewable electricity is key to achieving international, national, and local climate and greenhouse gas emissions targets, under both WEM and WAM scenarios as a higher rate of renewables will lower the carbon intensity of electricity in Ireland.

In November 2023, the IPCC published the '*AR6 Synthesis Report: Climate Change 2023*'[7], and is the final product of the AR6 of the International Panel on Climate Change. It summarizes the state of knowledge of climate change, its widespread impacts and risks, and climate change mitigation and adaptation. It confirms that the unsustainable and unequal energy and land use as well as historical use of fossil fuels have unequivocally caused global warming, with global temperatures approximately 1.1°C above 1850-1900 levels. A substantial 'emissions gap' exists between global greenhouse gas emissions in 2030 associated with the implementation of Nationally Determined Contributions (NDCs) announced prior to COP26. Parties to the Paris Agreement have two years to submit updated NDCs for the period up to 2035, ambition will need to be ratchetted up in order to limit warming to 1.5°C.

It is estimated that the Proposed Development will have a potential output in the range of 51.3 MW to 64.8 MW. On this basis, the Proposed Development will result in the net displacement of a maximum of 60,489 tonnes of carbon dioxide (CO_2) per annum, including accounting for back-up generation. When considering these greenhouse gas emissions within the context of the Electricity Sector Emissions Ceilings detailed in Chapter11, Section 11.3.2.5 of this EIAR, Carbon Budget 1 (2021-2025) has an Electricity Sector budget of 40 MtCO_2eq. and Carbon Budget 2 (2026-2030) has an Electricity Sector budget of 20 MtCO_2eq for large-scale deployment of renewables. Therefore, greenhouse gas emissions abatement associated with the Proposed Development will occur under the Electricity sector emissions ceiling first and second budget periods and throughout its operational life. Detailed information on the carbon offsets resulting from the Proposed Development are provided in Section 11.5.2.1.2 of Chapter 11 of this EIAR: Climate.

1.5.1.1.1 Reduction of Carbon Emissions and Other Greenhouse Gases

The production of renewable energy from the Proposed Development will assist in achieving the Government's and EU's stated goals of ensuring safe and secure energy supplies, promoting an energy future that is sustainable and competitively priced to consumers whilst combating energy price volatility and the effects of climate change. In April 2022 the first national carbon budget programme proposed by the Climate Change Advisory Council, was approved by Government and adopted by both Houses of the Oireachtas. Ireland national carbon budgets represent the total amount of emissions that may be released during a five-year period by a sector. The Sectoral Emissions Ceilings were launched in September 2022 with the objective to inform on the total amount of permitted greenhouse gas emissions that each sector of the Irish economy can produce during each carbon budget. All greenhouse gas emissions and all relevant sectors are included in the carbon budgets. They are as follows:

- 2021-2025: 295 Mt CO_2 eq. an average of -4.8% for the first budget period.
- 2026-2030: 200 Mt CO_2 eq. an average of -8.3% for the second budget period.
- 2031-2035: 151 Mt CO_2 eq. an average of -3.5% for the third provisional budget

The carbon budgets are calculated on an economy-wide basis and if Ireland does not achieve one of the carbon budget, any deficit must be made up in the next period.

In addition to a reduced dependence on oil and other imported fuels, the generation of electricity from wind power by the Proposed Development will displace a maximum 60,489 tonnes of carbon emissions per annum from the largely carbon-based traditional energy mix, the detail of which is presented in Section 11.5.2.1.2 in Chapter 11 of this EIAR.

[7] *IPCC Sixth Assessment Synthesis Report, Intergovernmental Panel on Climate Change AR6 Report: Climate Change 2023*

The EPA noted that in Ireland, the premature deaths attributable to poor air quality are estimated at 1,300 people per annum[8]. The European Environmental Agency (EEA) Report, 'Air Quality in Europe – 2022 Report' highlights the negative effects of air pollution on human health. The report assessed that poor air quality accounted for premature deaths of approximately 238,000 people in the 27 EU Member States in 2020, with regards to deaths relating to $PM_{2.5}$. The estimated impacts on the population in Europe of exposure to NO_2 and O_3 concentrations in 2020 were around 49,000 and 24,000 premature deaths per year, respectively. From this, 490 Irish deaths were attributable to fine particulate matter ($PM_{2.5}$), 50 Irish deaths were attributable to nitrogen oxides (NO_2) and 70 Irish deaths were attributable to Ozone (O_3) (Source: 'Air Quality in Europe – 2022 Report', EEA, 2022).

The EPA 2016 report '*Ireland's Environment – An Assessment'* states that the pollutants of most concern are NOx, (the collective term for the gases nitric oxide and nitrogen dioxide, PM (particulate matter) and O_3 (ozone). The EPA 2016 report goes on to state that:

> *"Ireland has considerable renewable energy resources, only a fraction of which are utilised to address our energy requirements.*
>
> *Wind, ocean, solar, hydro and geothermal energy do not produce GHG (greenhouse gas) emissions or emissions of air pollutants such as particulates, sulphur dioxide and nitrogen dioxide. Use of these renewable resources can have* ***considerable co-benefits for human health and ecosystems****. Meeting energy requirements from renewable resources can provide significant economic and employment benefits at local to national scales."*

The Proposed Development therefore represents an opportunity to further harness Ireland's significant renewable energy resources, with valuable benefits to air quality and in turn to human health. The consumption of fossil fuels for energy results in the release of particulates, sulphur dioxide and nitrogen dioxide to our air. The use of wind energy, by providing an alternative to electricity derived from coal, oil or gas-fired power stations, results in emission savings of carbon dioxide (CO_2), oxides of nitrogen (NO_x), and sulphur dioxide SO_2, thereby resulting in cleaner air and associated positive health effects.

1.5.2 Energy Security

At a national level, Ireland currently has one of the highest external dependencies on imported sources. In November 2023 the Department of the Environment, Climate and Communications (DECC) released '*Energy Security in Ireland to 2030*[9] which states that 'Irelands future energy will be secure by moving from an oil-, peat-, coal, and gas-based energy system to an electricity-led system, maximising our renewable energy potential flexibility and being integrated in Europe's energy systems. This report proposes a package of a wide range of measures to implement to 2030 to improve Ireland's energy security. Ireland is currently one of the most energy import dependent countries in the EU, having imported 77% of its energy supply in 2021 and 82% in 2022.[10] The '*Energy Security in Ireland to 2030'* report provides a roadmap to energy security in Ireland, on the basis of current energy policies and project and to implement the measures proposed as part of the energy security package. EirGrid in their '*All Island Generation Capacity Statement 2022 - 2031'* (October 2022), states that new wind farms commissioned in Ireland in 2021 brought total wind installed capacity to over 4,300MW, contributing to the overall RES-E percentage of 36.4% with wind energy accounting for 32.5%. Prior to 2015, Irelands import dependency of energy was over 90% but dropped to 71% in 2016 with the Corrib gas field starting production. Since 2018, Ireland's import dependency has been increasing as the output from the Corrib gas field reduces faster than we are adding new renewable sources.

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[8] https://www.epa.ie/our-services/monitoring--assessment/assessment/irelands-environment/air/
[9] *Department of the Environment, Climate and Communications (2023) Energy Security in Ireland to 2030.* <https://assets.gov.ie/276471/2d15ce6d-e555-4ada-a3cf-b325a5d7ba20.pdf>
[10] *Sustainable Energy Authority of Ireland (2023) Key insights from SEAIs 2022 National Energy Balance.* <https://www.seai.ie/data-and-insights/seai-statistics/key-publications/national-energy-balance/Key-Insights-from-2022-National-Energy-Balance.pdf>

In January 2024 the SEAI published their '*Energy in Ireland – 2023 Report*'[11], stating that in 2022, 49.2% of the electricity generated indigenously in Ireland came from gas, with renewables accounting for a further 38.9%. Coal, oil, non-renewable wastes (NRW), and peat accounted for the remainder of electricity generation in Ireland. The overall renewable energy share for gross final energy consumption for 2022 was 13.1%. 2022 had the lowest energy-related emissions of any year in the last quarter century, except for 2020 which was heavily influenced by the COVID-19 lockdowns. The SEAI '*Energy in Ireland – 2023 Report*', using early provisional data from January to September 2023, states that electricity emissions may be significantly reduced from 2022 levels in 2023 and the carbon intensity of the national grid may be down to 259 gCO_2/kWh, which, if achieved, will be the lowest carbon intensity value ever reached in Ireland.

Ireland continues to be hugely energy import-dependent leaving it exposed to large energy price fluctuations as a minimum and possibility of fuel shortages if a major energy crisis were to occur. The international fossil fuel market is growing increasingly expensive and is increasingly affected by international politics which can add to price fluctuations. This volatility will be increased as carbon prices increase in the future. This has implications for every Irish citizen.

The SEAI has stated that Ireland's heavy dependence on imported fossil fuels, *"is a lost opportunity in terms of keeping this money here in Ireland and further developing our abundant renewable resources"*[12].

The cost of carbon credits is included in all electricity traded, and the price of electricity generated by coal is particularly vulnerable due to its high carbon emissions per unit of electricity generated. Coal and peat generate almost 5% of Ireland's electricity, while gas generates 51%. Climate Action Plan 2024 calls for a reduction of 75% in electricity related emissions to not exceed the carbon budget allocations. At a time when the energy system is under severe pressure to ensure security of supply, amid projections of rapid electricity demand growth over the coming decade, any steps to reduce Ireland's dependence on imported fossil fuels will add to financial autonomy and stability in Ireland. The use of Ireland's indigenous energy resources, such as wind, will contribute to a reduction in energy imports.

The Energy White Paper 2015[13] ('the White Paper) notes "There will be a substantial increase in the cost of carbon in the short and medium term, through the EU Emissions Trading Scheme". Any steps to reduce dependence on imported fossil fuels will add to financial autonomy and stability in Ireland. As the White Paper notes:

> *"In the longer term, fossil fuels will be largely replaced by renewable sources".*

1.5.2.1 REPowerEU

In a Communication from the European Parliament on Joint European Action for more affordable, secure and sustainable energy[14], the European Commission proposed an outline of a plan to make Europe independent from Russian fossil fuels well before 2030 in light of Russia's invasion of Ukraine. Commission President Ursula von der Leyen stated:

> "*We must become independent from Russian oil, coal and gas. We simply cannot rely on a supplier who explicitly threatens us. We need to act now to mitigate the impact of rising energy prices, diversify our gas supply for next winter and accelerate the clean energy transition. The quicker we switch to renewables and hydrogen, combined with more energy efficiency, the quicker we will be truly independent and master our energy system.".*

[11] *Sustainable Energy Authority Ireland (2024) Energy in Ireland – 2023 Report*
[12] *Dr Eimear Cotter, Head of Low Carbon Technologies, SEAI - "Energy Security in Ireland 2015"*
[13] *Ireland's Transition to a Low Carbon Energy Future 2015-2030 (Department of Communications, Energy & Natural Resources, 2015)*
[14] *European Commission (March 2022) REPowerEU: Joint European Action for more affordable, secure and sustainable energy. Strasbourg.* https://ec.europa.eu/commission/presscorner/detail/en/ip_22_1511

In May 2022, the EU published the REPowerEU Plan[15] in light of Russia's invasion of Ukraine in February 2022. The core purpose of the plan, in addition to accelerating the EU's transition from the use of fossil fuel to renewable energy sources, is to end the dependence on Russian fossil fuels.

In April 2022, the Government published the National Energy Security Framework (NESF) providing a single overarching and initial response to address Ireland's energy security needs in the context of the war in Ukraine. This framework mirrors that of the EU, in which accelerating Ireland's transition from the use of fossil fuel to renewable energy sources is a key objective.

In September 2023, the European Parliament agreed to update the Renewable Energy Directive. The amending Directive EU/2023/2413 entered into force on 20th November 2023. There will be an 18-month period to transpose most of the directive's provisions into national law, with a shorter deadline of July 2024 for some provisions related to permitting for renewables. It sets an overall renewable energy target of at least 42.5% binding at EU level by 2030 - but aiming for 45%. In addition, as a part of the REPowerEU plan, the European Commission has proposed a series of additional targeted amendments to the renewable energy directive to reflect the ongoing changes in the energy landscape and the continued invasion of Ukraine.

1.5.3 Competitiveness of Wind Energy

While Ireland has a range of renewable resources, as the White Paper states "[Onshore Wind] *is a proven technology and Ireland's abundant wind resource means that a wind generator in Ireland generates more electricity than similar installations in other countries. This results in a lower cost of support*".

In fact, the cost of support is more than offset by the fact that adding large quantities of wind to the wholesale market drives down auction prices in any half hour trading period when the wind is blowing, i.e. for 80% of the hours of the year. Wind has a capacity factor of approximately 35%, which is its average output throughout the year relative to its maximum output. However, wind is generating power at some level for 80% of the hours of the year. A Pöyry study from 2015 showed that reaching our targets in 2020 would reduce wholesale prices by more than costs of new grid infrastructure, backup and the subsidies paid to wind, resulting in a net saving of €43m per year in 2020. The EU has noted that Ireland has one of the lowest costs of supporting renewables mainly because onshore wind is on a par with the cost of power from conventional generation when a full cost-benefit analysis is undertaken.

1.5.3.1 Background to EU Renewable Energy Targets

The burning of fossil fuels for energy creates greenhouse gases, which contribute significantly to climate change. These and other emissions also create acid rain and air pollution. Sources of renewable energy that are utilised locally with minimal impact on the environment are necessary to meet the challenges of the future. The EU adopted the Renewable Energy Directive (2018/2001 EU) on the Promotion of the Use of Energy from Renewable Sources in December 2018 which sets EU 2030 Renewable Energy Targets.

The Directive sets a legally binding mandatory national target for the overall share of energy from renewable sources for each Member State. This package is designed to achieve the EU's overall 20:20:20 environmental target, which consists of a 20% reduction in greenhouse gases, a 20% share of renewable energy in the EU's total energy consumption and a 20% increase in energy efficiency by 2020. To ensure that the mandatory national targets are achieved, Member States must follow an indicative trajectory towards the achievement of their target as outlined in Ireland's National Renewable Energy Action Plan (NREAP).

[15] *https://ec.europa.eu/commission/presscorner/detail/en/IP_22_3131*

The first Renewable Energy Directive (RED)[16] is legislation that influenced the growth of renewable energy in the EU and Ireland for the decade ending in 2020. From 2021, RED was replaced by the second Renewable Energy Directive (REDII),[17] which continues to promote the growth of renewable energy out to 2030. In September 2023 an update to RED was agreed. This update provides for an increased EU 2030 target of renewable energies to 45% of total energy consumption, 42.5% of which is to be provided as a compulsory contribution by the Member States. The updated Directive will speed up procedures to grant permit for new renewable energy power plants, such as solar panels or wind turbines.

Ireland's mandatory national target for 2020 was to supply 16% of its overall energy needs from renewable sources. This target covered energy in the form of electricity (RES-E), heat (RES-H) and transport fuels (RES-T). Ireland fell just short of this target with the total renewable share of gross final consumption (GFC) reaching 13.5%. The updated Directive has introduced a binding EU-wide target for overall RES of 42.5% in 2030 and requires Member States to set their national contributions to the EU-wide target. As per the National Energy and Climate Plan (NECP) 2021-2030, Ireland's overall RES target is 34.1% in 2030.

Under RED, the RES-E target was for 40% of gross electricity consumption to come from renewable sources in 2020 The actual RES-E achieved in 2020 by Ireland was 39.1%, falling just short of the national target. Under REDII, Ireland's National Energy and Climate Plan 2021-2030 included a planned RES-E of 70% in 2030, which has been replaced by the 80% by 2030 RES-E target as detailed in the more recent Climate Action Plan 2024, which will ensure that renewable electricity continues to form the backbone of Irish renewable energy use for the coming decade and beyond.

1.5.3.2 EU 2030 Renewable Energy Targets

The Climate Action and Low Carbon Development (Amendment) Act 2021 commits Ireland to reach a legally binding target of net-zero emissions no later than 2050, and a cut of 51% by 2030 (compared to 2018 levels). Under the 2021 Act, Ireland's national climate objective requires the state to pursue and achieve, by no later than the end of the year 2050, the transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy.

Ireland's statutory national climate objective and 2030 targets are aligned with Ireland's obligations under the Paris Agreement and with the European Union's objective to reduce GHG emissions by at least 55% by 2030, compared to 1990 levels and to achieve climate neutrality in the European Union by 2050.

Given the need to ratchet up the EUs clean energy transition, RED was revised in 2023, and the amending Directive EU/2023/2413 (REDIII)[18] entered into force on 20 November 2023. REDIII amended the EU-wide overall 2030 RES target from 32% to at least 42.5%, and it is assumed that Ireland's 2030 RES target will increase accordingly.

In December 2023, the Government published the most recent Climate Action Plan 2024, announcing a renewable electricity target of 80% by 2030 for Ireland. This is in line with targets previously announced in the Climate Action Plan 2021 and 2023.

The Climate Action Plan 2024 states that in order to meet the required level of emissions reduction by 2030 and the 80% renewable electricity generation target by 2030, the installed generation capacity of

[16] *Directive 2009/28/EC on the promotion of the use of energy from renewable sources. Available from: https://eur-lex.europa.eu/legalcontent/EN/ALL/?uri=celex%3A32009L0028*
[17] *Directive (EU) 2018/2001 on the promotion of the use of energy from renewable resources (recast). Available from: https://eurlex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32018L2001*
[18] *Directive (EU) 2023/2413 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources and repealing Council Directive (EU) 2015/652. Available from: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202302413*

onshore will need to reach 9GW and at least 5GW of offshore wind. By May 2022, the installed wind capacity in the Republic of Ireland is over 4.3GW according to Wind Energy Ireland[19]. As noted previously, Ireland missed it's 2020 renewable energy target of 40% with a renewable share in electricity of 39.1%, and by the end of 2021, Irelands renewable energy share for electricity generation was 32.5%. With a renewable share of electricity generation at 80% in mind and a target of 9 GW installed onshore wind by 2030, it is now more critical than ever that we continue to progress renewable energy development in Ireland so that we are successful in meeting our 2030 targets. Further detail on the EU 2030 targets is noted in Chapter 2.

1.5.4 Increasing Energy Consumption

As detailed above, the Climate Action Plan 2024 identifies a need for 9 GW of onshore wind generation in order for Ireland to meet its 2030 targets. In their '*All Island Generation Capacity Statement 2022 - 2031'* (October 2022), EirGrid estimate that installed capacity of wind generation is set to increase to at least 12 GW between onshore and offshore capacity as Ireland endeavours to meet its renewable targets in 2030 and beyond.

Failure to meet Ireland's targets for renewable energy will result in substantial EU sanctions. The Department of Public Expenditure and Reform (DPER) in their report 'Future Expenditure Risks associated with Climate Change/Climate Finance'[20] concluded that *'potential costs of purchasing non-ETS GHG compliance for the Irish Exchequer for the 2020 to 2030 period could have a cumulative total in the billions in the absence of any further policy changes'*. If Ireland decided to backfill shortfalls in the RES-H target with additional renewable electricity this could significantly reduce these costs.

In April 2016[21] the SEAI estimated the historic build rate for wind energy deployment as 180 MW per year since 2005. If this average build rate over the remaining period between 2018 and 2020 is assumed, then approximately 3.85 GW of wind would be built up to 2020. The SEAI has provided a provisional estimate of wind capacity in Ireland in 2023 to be 4.59GW[22].

It is noted that the key driver for electricity demand in Ireland for the next number of years is the connection of new large energy users, such as data centres. This statement notes that '*Large industrial connections normally do not dominate a country's energy demand forecast but this is the case for Ireland at the moment*'. EirGrid analysis[23] shows that demand from data centres could account for 31% of all demand by 2027 in a median demand scenario (accounts for the connection of all 1400MVA of potential demand in the connection process). The median demand scenario is now higher than for last year's forecast for high demand, indicating the progression of many of the data centre projects.

In 2015, IWEA commissioned a study '*Data Centre Implications for Energy Use in Ireland'* which concluded that an extra approximately 1 Gigawatt (GW) of electricity demand could materialise between 2015 and 2020 due to growth in data centres. More recently, data available from Bitpower[24] at the end of 2021 noted a 25% increase in completed data centre capacity over the past 12 months with a total of 70 operational data centres with a combined total of 900 MW of connected power capacity. Ten new data centres came online between the period of November 2020 and November 2021. The increase in growth of data centres means an increase in electricity demand, with many of the proposed data centres committing to using 100% renewable energy which will result in an increased demand for renewable electricity as detailed above.

In the context of increasing energy demand and prices, uncertainty in energy supply and the effects of climate change, our ability to harness renewable energy such as wind power plays a critical role in

[19] *https://windenergyireland.com/about-wind/facts-stats*
[20] https://igees.gov.ie/wp-content/uploads/2013/10/Future-Expenditure-Risks-associated-with-Climate-Change-Climate-Finance1.pdf
[21] *https://www.seai.ie/publications/Ireland___s-Energy-Targets-Progress-Ambition-and-Impacts.pdf*
[22] *Sustainable Energy Authority of Ireland (2024) Energy in Ireland – 2023 Report*
[23] *Eirgrid (2018). All-Island Generation Capacity Statement 2018-2027*
[24] *http://www.bitpower.ie/images/Reports/2020_H2_Report.pdf*

creating a sustainable future. The Department of the Environment, Climate and Communications have set a target for Ireland of 80% of total electricity consumption to come from renewable resources by 2030, this target forms part of the Government's strategy to make the green economy a core component of its economic recovery plan for Ireland. It is envisaged that wind energy will provide the largest source of renewable energy in achieving this target, with a target of 9 GW onshore wind installed generation capacity and a target of 5 GW offshore wind installed generation capacity.

The Department of Communications, Energy & Natural Resources (DCENR) noted in their Draft Bioenergy Plan 2014, that achieving the anticipated renewable energy usage in the three energy sectors will be challenging, with the 12% for renewable heat being particularly so. SEAI estimate that the shortfall could be in the region of 2% to 4% of the 12% RES-H target. Given that individual member states 2030 targets are set at a more challenging level than 2020, fines could persist for an extended number of years, and so the total cost to Ireland could run to billions. For comparison, the entire wholesale electricity market has an annual value of around €3bn.

In the medium-term, with the introduction of electric vehicles and uptake of smart demand such as storage heating and heat pumps, emissions in the heat and transport sector will be substantially reduced. A high renewables electricity system is the foundation of such a transformation.

The White Paper published by DCENR in December 2015 expanded on the vision set out above. It outlines a radical transition to a low carbon future which will involve amongst other things, *'generating our electricity from renewable sources of which we have a plentiful indigenous supply'* and *'Increasing our use of electricity and biogas to heat our homes and fuel our transport'*.

The DCENR confirmed in the publication of the White Paper '*Ireland's Transition to a Low Carbon Future' 2015 – 2030*, that wind is the cheapest form of renewable energy:

> *"(Onshore wind) is a proven technology and Ireland's abundant wind resource means that a wind generator in Ireland generates more electricity than similar installations in other countries. This results in a lower cost of support."*

EU countries have agreed on a new 2030 Framework for climate and energy, including EU-wide targets and policy objectives for the period between 2020 and 2030. These targets aim to help the EU achieve a more competitive, secure and sustainable energy system and to meet its long-term 2050 greenhouse gas reductions target. It is noted that a binding EU target of 42.5% for renewable energy by 2030 has been set by the EU 2030 Framework for Climate and Energy.

These sources of 'flexible demand' allow the system to match intermittent renewable energy resources with minimal extra cost. Additional interconnection is also planned with the UK and France, further assisting in the integration of wind (and in the future solar) on the power system.

A number of alternative energy types have been examined when considering how best to meet this renewable energy target.

In 2014, a report prepared by UK consultant BW Energy for the Rethink Pylons campaign group has suggested that converting Moneypoint generation station (which runs solely on coal) from coal to biomass would have enabled Ireland to meet 2020 renewable energy targets. Dr Brian Motherway, Chief Executive SEAI[25] refutes this claim. While Dr Motherway agrees that biomass offers benefits and is helping Ireland to move away from fossil fuels he states that "*the conversion of Moneypoint to biomass has been considered a number of times over the years, including actual trials of small amounts of biomass in the station. However, the technical and economic challenges have proven far greater than some would have us believe"*.

[25] http://www.seai.ie/News_Events/Press_Releases/2014/Biomass-is-a-big-part-of-the-solution-but-not-the-whole-solution.html

The reason being that the move of Moneypoint from coal to biomass would not entail a clean swap. In fact, '*to allow for combustion of biomass, a full redesign and rebuild of much of the station would be required*'. In the UK where this has been done, energy generation stations have required significant financial support to make the process viable and with each unit of energy in the UK being worth approx. 13 cents, almost double that of Ireland which is approx. 7 cents, wind energy works out cheaper in Ireland. Also, the amount of biomass required to feed Moneypoint would require 300,000ha of land; an equivalent area of Counties Wexford and Carlow being planted with willow which is far more than Ireland currently produces which means we would need to import.

Importation raises the question; would this be cost effective? As prices are volatile and availability of biomass is difficult to predict Ireland would become dependent on the uncertainty of imported biomass. It is also noted that there will be emissions from transport and distribution. The further the biomass is transported, the greater the greenhouse gas emissions[26]. So, while biomass is currently contributing to a move to renewable energy production, on its own it is not the sole answer to meeting Ireland's renewable energy targets. Ireland has a legal obligation to diversify its energy sources requiring the development of renewable energy to avoid substantial fines.

The Joint Committee on Climate Action published its cross-party report entitled, '*Climate Change: A Cross- Party Consensus for Action'* (March 2019). This report highlights the requirements for alternate energy production. More specifically, the report notes that it is currently planned to stop burning coal at Moneypoint by 2025 as well as peat at Bord na Mona and ESB stations by 2030. In December 2023, the DECC published Climate Action Plan 2024 which is the third annual update to Irelands Climate Action Plan 2019 and the second to be prepared under the Climate Action and Low Carbon Development (Amendment) Act 2021. Climate Action Plan 2024 notes the need for renewable alternatives to coal and peat. Further information on the CAP can be seen in Chapter 2.

Climate Action Plan 2024 states that as electrification and decarbonisation of other sectors continues, there will be an increase in electricity demand, and a transferring of emissions from those sectors to the electricity sector. The deployment of renewables needs to outpace the growth in energy demand for it to deliver the absolute reductions in greenhouse gas emissions required. Therefore, the timing of the delivery of the renewable energy generation relative to the scale and pace of growth in electricity demand is a critical factor. In the high demand scenario outlined in the Programme for Government, electricity demand will almost double by 2030, while electricity emissions are to be reduced by 60-80% at the same time..

Underlying drivers of changes in electricity demand include:

- Data centres are forecast to continue to grow by up to ~9 TWh in 2030 (~2316% of total demand).
- Transport electricity demand is forecast to grow (~23% p.a.) as a result of fast uptake of EV charging.
- Electrical heating in industry will increase by more than 2.5 times in 2030 from 2017 levels.
- Building energy efficiency improvements from an extensive retrofit programme will moderate the growth in electricity demand from new heat pumps in buildings.

Against this backdrop, the importance of wind energy as the main component of Ireland's renewable energy development is acknowledged, and wind energy is accepted as the main contributor to meeting the Country's national climate change and energy supply obligations. Notwithstanding this, it must also be acknowledged that not every part of Ireland is well endowed with wind resources and therefore, not all counties will be able to deliver wind-based renewable energy. Furthermore, whilst it is accepted that there are other renewable energy technologies in operation, for the foreseeable future many areas will

[26] *Sustainability Criteria Options and Impacts for Irish Bioenergy Resources (SEAI 2019)*

be unable to deliver significant renewable energy output. This primarily applies to the more populous areas.

National and international renewable energy and climate change targets must be achieved and it is crucial that these are appropriately translated and implemented at regional and local levels. Wind farm development and design involves balancing the sometimes-conflicting interests of constraints (e.g. natural and built heritage, human beings, ecological, ground conditions, hydrological, etc.) with visual amenity and the technological/economic requirements/realities of the specific project and turbines. The Wind Farm layout takes account of all site constraints and the distances to be maintained between turbines and from houses, roads, etc. The layout is based on a combination of the results of all site investigations and surveys that have been carried out during the EIAR process, the community engagement process that began in 2022 and the scoping with statutory and non-statutory consultees.

1.5.5 Economic Benefits

In addition to helping Ireland avoid significant fines and reducing environmentally damaging emissions, the Proposed Development will have significant economic benefits. At a national level, Ireland currently has one of the highest external dependencies on imported sources of energy, such as coal, oil and natural gas. As detailed in the SEAI Report '*Energy in Ireland 2023*, Ireland has a high import dependence on oil and gas and is essentially a price-taker on these commodities. The '*Energy in Ireland 2022 Report*'[27] stated that 2021 was the first year since 2016, in which Ireland's indigenous production of energy from renewables (17,500 GWh) exceeded that of indigenous gas (14,600 GWh); however, in 2022 indigenous gas production once again exceeded renewables production. The SEAI estimates electricity emissions to be 7.3 $MtCO_2e$ in 2023, the addition of this best estimate for 2023 to the definitive 2021 and 2022 electricity emissions reported by the EPA identifies a 3-year 2021 - 2023 total of 27.0 $MtCO_2e$. The 5-year 2021-2025 sectoral emission ceiling for electricity is 40 $MtCO_2e$. This means that 13.0 $MtCO_2e$ of budgeted electricity emissions will remain for the last 2 years of the 2021-2025 carbon budget. To remain within its sectoral emission ceiling, electricity emissions would therefore need to remain below an average of 6.5 $MtCO_2e$ in both 2024 and 2025.The SEAI report '*Energy in Ireland – 2023 Report'* indicated that wind energy:

- Accounted for 85.7% of renewable energy generated in 2022
- Capacity at the end of 2022 was 4.54GW, this is a 4.6% increase from wind energy capacity in 2021

The 2014 report '*The Value of Wind Energy to Ireland'*, published by Pőyry, stated that growth of the wind sector in Ireland could support 23,850 jobs (construction and operational phases) by 2030. If Ireland instead chooses to not develop any more wind, then by 2030 the country will be reliant on natural gas for most of our electricity generation, at a cost of €671 million per annum in fuel import costs.

In April 2021, Wind Energy Ireland published a report produced by KPMG on the '*Economic Impact of Onshore Wind in Ireland*' stating that Irish wind farms are worth €400 million to the economy every year and it is expected to rise to €550 million by the end of the decade. If Ireland are to achieve the 8,200 MW target set in the Climate Action Plan 2021,the total industrial output across operating and capital activities would rise from 1.1bn in 2020 (from the 4,200 MW installed capacity) to 1.5bn in 2030.

The Proposed Development will be capable of providing power to over 47,300 households every year, as presented in the calculations in Section 4.3 of this EIAR.

The Proposed Development will help to supply the rising demand for electricity, resulting from renewed economic growth. The EirGrid report '*All-Island Generation Capacity Statement 2022 – 2031'*

[27] *Sustainable Energy Authority Ireland (2022) Energy in Ireland – 2022 Report*

(December 2022) notes that the median electricity demand forecast on the island of Ireland is expected to grow by 21% in 2030. Much of this growth is expected to come from new data centres in Ireland.

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

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

It is estimated that the Proposed Development will create up to 90 jobs during the construction, operational and maintenance phases overall. During construction, additional employment will be created in the region through the supply of services and materials to the wind energy development. There will also be income generated by local employment from the purchase of local services i.e. travel, goods and lodgings.

There are substantial opportunities available for areas where wind farms and other types of renewable energy developments are located, in the form of Community Gain Funds. The value of this fund will be directly proportional to the level of installed MWs at the site and will support and facilitate projects and initiatives including youth, sport and community facilities, schools, educational and training initiatives, and wider amenity, heritage, and environmental projects. The Proposed Development has the potential to increase the generating capacity of the wind farm and therefore there will be greater community gain.

1.6 Purpose and Scope of the EIAR

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

It is important to distinguish the Environmental Impact Assessment (EIA) to be carried out by An Bord Pleanála, from the EIAR accompanying the planning application. The EIA is the assessment carried out by the competent authority, which includes an examination that identifies, describes and assesses in an appropriate manner, in the light of each individual case and in accordance with Articles 4 to 11 of the Environmental Impact Assessment Directive, the direct and indirect significant effects of the project on the following:

a) *population and human health*
b) *biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC*
c) *land, soil, water, air and climate*
d) *material assets, cultural heritage and the landscape*
e) *the interaction between the factors referred to in points (a) to (d)*

The EIAR submitted by the applicant provides the relevant environmental information to enable the EIA to be carried out by the competent authority. The information to be contained in the EIAR is prescribed in Article 5 of the revised EIA Directive described in Section 1.3 above.

1.7 Structure and Content of the EIAR

1.7.1 General Structure

This EIAR uses the grouped structure method to describe the existing environment, the potential impacts of the Proposed Development thereon and the proposed mitigation measures. Background information relating to the Proposed Development, scoping and consultation undertaken and a description of the Proposed Development are presented in separate sections. The grouped format sections describe the impacts of the Proposed Development in terms of population and human health, biodiversity, with specific attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EEC; land, soils and geology, water, air and climate, noise and vibration, landscape and visual, cultural heritage and material assets such as traffic and transportation, together with the interaction of the foregoing and schedule of mitigation and monitoring.

The chapters of this EIAR are as follows:

- Introduction
- Background to the Proposed Development
- Consideration of Reasonable Alternatives
- Description of the Proposed Development
- Population and Human Health
- Biodiversity (excluding Birds)
- Ornithology
- Land, Soils and Geology
- Hydrology and Hydrogeology
- Air
- Climate
- Noise and Vibration
- Cultural Heritage
- Landscape and Visual
- Material Assets (including Traffic and Transport, Telecommunications, Aviation and Utilities)
- Major Accidents and Natural Disasters
- Interactions of the Foregoing
- Schedule of Mitigation Measures

The EIAR also includes a Non-Technical Summary, which is a condensed and easily comprehensible version of the EIAR document. The non-technical summary is laid out in a similar format to the main EIAR document and comprises a description of the Proposed Development followed by the existing environment, impacts and mitigation measures presented in the grouped format.

1.7.2 Description of Likely Significant Effects and Impacts

As stated in the *'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports'* (EPA, May 2022), an assessment of the likely impacts of a development is a statutory requirement of the EIA process. The statutory criteria for the presentation of the characteristics of potential impacts requires that potential significant impacts are described with reference to the extent, magnitude, complexity, probability, duration, frequency, reversibility and trans–boundary nature (if applicable) of the impact.

The classification of impacts in this EIAR follows the definitions provided in the Glossary of Impacts contained in the following guidance documents produced by the European Commission (EC) and the Environmental Protection Agency (EPA):

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, May 2022)
- 'Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report' (EC, 2017).

The European Commission published a number of guidance documents in December 2017 in relation to Environmental Impact Assessment of Projects (Directive 2011/92/EU as amended by 2014/52/EU) including '*Guidance on Screening*', '*Guidance on Scoping*' and '*Guidance on the preparation of the Environmental Impact Assessment Report*', which have also been consulted.

Table 1-2 presents the glossary of impacts as published in the EPA guidance document (EPA, May 2022). Standard definitions are provided in this glossary, which allows the evaluation and classification of the quality, significance, duration and type of impacts associated with a proposed development on the receiving environment. The use of pre-existing standardised terms for the classification of impacts ensures that the EIA employs a systematic approach, which can be replicated across all disciplines covered in this EIAR. The consistent application of terminology throughout this EIAR facilitates the assessment of the Proposed Development on the receiving environment.

Table 1-2 Impact Classification Terminology (EPA, 2022)

Impact Characteristic	Term	Description
Quality	Positive	A change which improves the quality of the environment
	Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
	Negative	A change which reduces the quality of the environment
Significance	Imperceptible	An effect capable of measurement but without significant consequences
	Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
	Moderate	An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends

Impact Characteristic	Term	Description
	Significant	An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
	Very significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment
	Profound	An effect which obliterates sensitive characteristics
Extent & Context	Extent	Describe the size of the area, number of sites and the proportion of a population affected by an effect
	Context	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions
Probability	Likely	Effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented
	Unlikely	Effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented
Duration and Frequency	Momentary	Effects lasting from seconds to minutes
	Brief	Effects lasting less than a day
	Temporary	Effects lasting less than a year
	Short-term	Effects lasting one to seven years

Impact Characteristic	Term	Description
	Medium-term	Effects lasting seven to fifteen years
	Long-term	Effects lasting fifteen to sixty years
	Permanent	Effect lasting over sixty years
	Reversible	Effects that can be undone, for example through remediation or restoration
	Frequency	Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)
Type	Indirect	Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway
	Cumulative	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.
	'Do Nothing'	The environment as it would be in the future should the subject project not be carried out
	'Worst Case'	The effects arising from a project in the case where mitigation measures substantially fail
	Indeterminable	When the full consequences of a change in the environment cannot be described
	Irreversible	When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost

Impact Characteristic	Term	Description
	Residual	Degree of environmental change that will occur after the proposed mitigation measures have taken effect
	Synergistic	Where the resultant effect is of greater significance than the sum of its constituents

Each impact is described in terms of its quality, significance, extent & context, probability, duration & frequency, and type, where possible. A 'Do-Nothing' impact is also predicted in respect of each environmental theme in the EIAR. Residual impacts are also presented following any impact for which mitigation measures are prescribed. The remaining impact types are presented as required or applicable throughout the EIAR. Any potential interactions between the various aspects of the environment assessed throughout this EIAR are presented in Chapter 15: Interaction of the Foregoing.

1.8 Project Team

1.8.1 Project Team Responsibilities

The companies and staff listed in Table 1-3 were responsible for completion of this EIAR for the Proposed Development. Further details regarding project team members are provided below.

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. The qualifications and experience of the principal staff from each company involved in the preparation of this EIAR are summarised in Section 1.8.2 below. Each chapter of this EIAR has been prepared by a competent expert in the subject matter.

Table 1-3 Companies and Staff Responsible for EIAR Completion

Consultants	Principal Staff Involved in Project	EIAR Input*
MKO Tuam Road, Galway, H91 VW84	Michael Watson (MW) Eoin O'Sullivan (EOS) Shaun Doolin (ShD) Morgan Valvik (MV) Tom Madden (TM) Meabhann Crowe (MC) Alan Clancy (AC) Jade Power (JP) Pat Roberts (PR) John Hynes (JH) Rachel Walsh (RW) Aoife Joyce (AJ) Sara Fissola (SF) Keith Costello (KC) Cathal Bergin (CB) Laura McEntegart (LME) Tim Murphy (TM) Laura Gránicz (LG) Shane Connolly (SC)	Project Managers, Scoping and Consultation, Preparation of Natura Impact Statement, EIAR Report Sections: 1. Introduction (EOS) 2. Background to the Proposed Development (JP, AC) 3. Considerations of Reasonable Alternatives (ShD) 4. Description of the Proposed Development (ShD, EOS) 5. Population & Human Health (ShD) 6. Biodiversity (RW, PR, SF, KC, CB, LME, TM, LG, SC) 7. Ornithology (DoD, PC, PM, SD, AM, AtM, CC, CD, CG,

Consultants	Principal Staff Involved in Project	EIAR Input*
	Dervla O'Dowd (DoD) Padraig Cregg (PC) Patrick Manley (PM) Susan Doyle (SD) Allen Mee (AM) Athena Michaelides(AtM) Cian Cahlin (CC) Colin Delahunt (CD) Conor Geoghegan (CG) Ciaran McKenna (CMcK) Chris Peppiatt (CP) Fionn O'Donoghue (FOD) Gerry Murphy (GM) Ian Hynes (IH) Jonah Gaine (JG) Katie Grice (KG) Louis De Vries (LDV) Marcus Hogan (MG) Margeaux Pierrel (MP) Mike Sylvia (MSy) Nessa Lee (NL) Peter Capsey (PC) Sean O'Brien (SOB) Tony Kennealy (TK) Tom Ryan (TR) Zuzana Erosova (ZE) Zak O'Connor (ZOC) Ellen Costello (EC) Catherine Johnson (CJ) Jack Workman (JW) Jack Smith (JS) Matthew Davis (MS) Joseph O'Brien (JOB) Killian Devereux (KD)	CMcK, CP, FOD, GM, IH, JG, KG, LDV, MG, MP, MSy, NL, PC, SOB, TK, TR, ZE, ZOC) 10. Air (ShD, EOS) 11. Climate (CJ, EC) 13. Landscape & Visual (JW, JS, MS) 15. Material Assets (non-Traffic) (ShD, EOS) 16. Major Accidents and Natural Disasters (ShD, EOS) 17. Interaction of the Foregoing (ShD, EOS) 18. Schedule of Mitigation (ShD, EOS, TM)
Hydro Environmental Services 22 Lower Main Street Dungarvan Co. Waterford	Michael Gill David Broderick	Preparation of EIAR Sections: 8. Land, Soils & Geology 9. Hydrology & Hydrogeology
Fehily Timoney & Company The Grainstore Singletons Lane Bagnelstown Co. Carlow	Ian Higgins	Preparation of Peat Stability Assessment & Peat Management Plan
AWN Consulting The Tecpro Building Clonshaugh Business & Technology Park Dublin 17	Dermot Blunnie Mike Simms	Preparation of EIAR Section 12. Noise and Vibration

Consultants	Principal Staff Involved in Project	EIAR Input*
Tobar Archaeological Services Saleen Midleton Co. Cork	Miriam Carroll	Preparation of EIAR Section 14. Cultural Heritage
Alan Lipscombe Traffic and Transport Consultants Claran, Headford, Co. Galway	Alan Lipscombe	Swept Path Analysis, Preparation of EIAR Section 15. Material Assets - Traffic and Transport
Ai Bridges Ltd Quin Road Business Park Ennis Co. Clare	Kevn Hayes	Telecommunications and Aviation Assessment
Cyrrus Ltd	Shaun Gouvera Kevinn Sissons	Aviation Assessment
Digital Land Surveyors Unit 4, First Floor Glen View Business Park Kilmacrennan Road Letterkenny Co. Donegal	William Gallagher	Autotrack Analysis
Collett & Son Halifax, West Yorkshire, UK	Steven Managham	Route Assessment

* (A Statement of Authority is included in each chapter of this EIAR detailing the experts who contributed to the preparation of this report, identifying for each such expert the part or parts of the report which he or she is responsible for or to which he or she contributed, his or her competence and experience, including relevant qualifications in relation to such parts, and such additional information in relation to his or her expertise that demonstrates the expert's competence in the preparation of the report and ensures its completeness and quality.

1.8.2 Project Team Members

1.8.2.1 MKO

Michael Watson, MA; MIEMA, CEng, PGeo

Michael Watson is Director and head of the Environment Team in MKO. Michael has over 20 years' experience in the environmental sector. Following the completion of his Master's Degree in Environmental Resource Management, Geography, from National University of Ireland, Maynooth he worked for the Geological Survey of Ireland and then a prominent private environmental & hydrogeological consultancy prior to joining MKO in 2014. Michael's professional experience includes managing Environmental Impact Assessments, EPA License applications, hydrogeological assessments, environmental due diligence and general environmental assessment on behalf of clients in the wind farm, waste management, public sector, commercial and industrial sectors nationally. Michaels key

strengths include project strategy advice for a wide range and scale of projects, project management and liaising with the relevant local authorities, Environmental Protection Agency (EPA) and statutory consultees as well as coordinating the project teams and sub-contractors. Michael is a key member of the MKO senior management team and as head of the Environment Team has responsibilities to mentor various grades of team members, foster a positive and promote continuous professional development for employees. Michael also has a Bachelor of Arts Degree in Geography and Economics from NUI Maynooth, is a Member of IEMA, a Chartered Environmentalist (CEnv) and Professional Geologist (PGeo).

Eoin O'Sullivan M.Sc., B.Sc., CWEM; CEnv

Eoin O'Sullivan is Project Director Environment at MKO with over 14 years of experience in the assessment of a wide range of energy and infrastructure related projects and working in the fields of environmental and human health risk assessment, waste management, waste policy and permitting. Eoin has wide experience in the project management of large scale infrastructural projects and brownfield developments which includes all aspects of geo-environmental and geotechnical investigation. Eoin holds a BSc (Hons) in Environmental Science & Technology and a MSc in Environmental Engineering. Prior to taking up his position with MKO in July 2017, Eoin worked as a Chartered Senior Engineer with CGL in Surrey, UK. Prior to this Eoin worked as a Project Engineer with RPS Consulting Engineers in Belfast. Eoin has wide experience in the project management of large scale brownfield developments and has routinely undertaken detailed quantitative risk assessment for the protection of controlled waters and ground gas risk assessments. Eoin has also experience in completing PPC Permit Applications and in the preparation of Environmental Impact Assessment Reports for renewable energy projects, quarries and a number of non-hazardous landfill sites and anaerobic digesters for both public and private clients. Eoin's key strengths include project strategy advice for a wide range and scale of projects, project management and liaising with the relevant local authorities, Environmental Protection Agency (EPA) and statutory consultees as well as coordinating the project teams and sub-contractors. Eoin is a Chartered Member of the Chartered Institute of Water and Environmental Management and Chartered Environmentalist with the Society of Environment.

Shaun Doolin BA (Hons), M.Sc (Hons).

Shaun was an Environmental Scientist with MKO from March 2021 to March 2024. Shaun holds an MSc (Hons) in Environmental Science and a BA (Hons) in General Science/Geography from Trinity College Dublin, where he focused his studies on environmental data analysis. Shaun's key strengths and expertise are in GIS, data analysis, fieldwork, project management and report writing. Since joining MKO, Shaun has been involved in a range of large-scale onshore wind farm developments. In his role as an Environmental Scientist, Shaun works with and co-ordinates large multidisciplinary teams, including members from MKO's Environmental, Planning, Ecological and Ornithological departments, as well as sub-contractors from various fields in the preparation and production of Environmental Impact Assessment Reports to accompany Planning Applications for various large-scale renewable energy developments.

Morgan Valvik M.Sc

Morgan is a Graduate Environmental Scientist at MKO having joined the company in September 2023. Morgan holds an MSc in Environmental Science from Trinity College Dublin, where she completed a thesis on the comparison of the regeneration and spreading patterns of Rhododendron Ponticum in different habitats. Prior to joining MKO, she worked as a Graduate Environmental Scientist for AKRF Inc. where she conducted site assessments and remedial oversight related to brownfield sites and landfills in the United States. Morgan's key strengths and areas of expertise are in report writing, environmental remediation, and natural areas restoration. Since joining MKO, Morgan has been involved in the preparation of Environmental Impact Assessment Screening Reports, Construction and Environmental Management Plans, and Environmental Reports for a wide range of projects. Morgan is a graduate member of the Chartered Institution of Water and Environmental Management.

Tom Madden BSc.

Tom Madden is an Environmental Scientist with MKO with over 4 years of experience in environmental consultancies. Tom holds B.Sc. (Hons) in Environmental Science from the University of Limerick. Prior to taking up his position with MKO in March 2022, Tom worked as an Environmental Consultant with Panther Environmental and held previous posts with Mulroy Environmental whilst being based in Dublin. Tom has specialist knowledge in environmental sampling (water, groundwater, dust and soil) and has experience in preparing an array of environmental reports such as Construction Environmental Management Plans, EIA Screenings, Decommissioning Plans and more. Since joining MKO, Tom has been involved on a significant range of energy infrastructure, commercial, housing and residential projects in addition to project managing quarry EIA planning applications through the statutory planning system, with more projects in the pipeline. Within MKO, Tom plays a large role in the management and confidence building of junior members of staff and works as part of a large multi-disciplinary team to produce EIA Reports. Tom is in the process of becoming a chartered member of CIWEM.

Meabhann Crowe BA (Hons), M.Sc.

Meabhann Crowe is a Project Planner with MKO with over 10 years private sector experience. She is a fully chartered member of the Royal Town Planning Institute (MRTPI). Meabhann holds a BA (Hons) in Geography, Sociological and Political Science and a Masters in Urban and Regional Planning. Prior to taking up her position with McCarthy Keville O'Sullivan in October 2018, Meabhann was employed as an Associate Director with Colliers International in their Edinburgh office, prior to which she was employed for several years with Halliday Fraser Munro. In her time in the industry Meabhann has been active on a number of instructions across a broad spectrum of mixed-use, residential, commercial, renewable energy and retail projects.

Meabhann brings particular expertise in initial development feasibility appraisals and development strategies. Her experience in managing large multi-disciplinary teams in the preparation of local and major planning applications across residential and mixed-use and retail developments means she has a wealth of knowledge to draw on in the early stages of development. She has particular experience in preparing and managing site strategies which include both responding to emerging planning policy whilst also preparing and progressing planning applications and appeals.

Alan Clancy BA (Hons), MPlan

Alan Clancy is a Project Planner with MKO with over 5 years of experience in private practice. Alan holds a BA in Geography & History and Masters in Planning and Sustainable Development. Prior to taking up his position with MKO in February 2021, Alan worked as a Planner for Indigo Telecom Group in Limerick Ireland where he assisted with management of all planning aspects of new telecommunications network roll out programmes, retentions of existing sites and all aspects of dealing with planning applications and appeals for leading telecommunications operators. Prior to this, Alan worked in the UK with the JTS Partnership LLP, where he gained experience as a graduate planner through to planner level. Alan has experience across a range of sectors including commercial, residential and industrial, as well as having experience with providing development advice and undertaking background research for clients, preparing planning applications of varying sizes as well as planning appeals and conditions compliance and managing all aspects of the planning process for commercial, educational and Infrastructural projects. Alan's key strengths and areas of expertise are in development management, provision of planning advice and project management of small and medium sized projects. Since joining MKO, Alan has been working closely with Pamela Harty, Meabhann Crowe and the wider planning team, assisting with various projects including Strategic Infrastructure Developments, lodgement and management of Planning Applications, Development Plan Submissions and preparing Development Potential Reports. Alan is working towards chartered membership of the Irish Planning Institute.

Jade Power BSc, MRUP

Jade Power is a Planner with MKO with over 2 years of experience in private practice. Jade holds a Bachelor's in Social Sciences (Environmental Policy) and Masters in Rural and Urban Planning (MRUP) from University College Dublin (UCD). Prior to taking up her position with MKO in November 2022, Jade worked as a Planner for Thornton O'Connor Town Planning in Dublin City, where she gained experience as a graduate planner through to planner level. Jade has experience across a range of sectors including commercial, residential, and industrial, as well as having experience with providing development advice and undertaking background research for clients, preparing planning applications of varying sizes as well as planning appeals and managing all aspects of the planning process of various development projects. Since joining MKO, Jade has been working closely on renewable energy infrastructure projects with Colm Ryan, Alan Clancy, and the wider planning team, assisting with various projects including Strategic Infrastructure Developments (SIDs) and the lodgement and management of planning applications for renewable energy projects. Jade is a member of the Irish Planning Institute (IPI) and the Royal Town Planning Institute (RTPI).

Pat Roberts B.Sc. (Env.)

Pat Roberts is a Principal Ecologist with MKO with over 12 years post graduate experience of providing ecological services in relation to a wide range of developments at the planning, construction and monitoring stages. Pat holds B.Sc.(Hons) in Environmental Science. Pat has extensive experience of providing ecological consultancy on large scale industrial and civil engineering projects. He is highly experienced in the completion of ecological baseline surveys and impact assessment at the planning stage. He has worked closely with construction personnel at the set-up stage of numerous construction sites to implement and monitor any prescribed best practice measures. He has designed numerous Environmental Operating Plans and prepared many environmental method statements in close conjunction with project teams and contractors. He has worked extensively on the identification, control and management of invasive species on numerous construction sites. Prior to taking up his position with MKO in June 2005, Pat worked in Ireland, USA and UK as a Tree Surgeon and as a nature conservation warden with the National Trust (UK) and the US National Park Service. Pats key strengths include his depth of knowledge and experience of a wide range of ecological and biodiversity topics and also in his ability to understand the requirements of the client in a wide range of situations. He currently manages the ecological team within MKO and ensures that the outputs from that team are of a very high standard and meet the requirements of the clients and relevant legislation and guidelines. He is a full member of the Chartered Institute of Ecologists and Environmental Managers (CIEEM),

John Hynes M.Sc. (Ecology) B.Sc.

John Hynes is a Director and head of the Ecology Team in MKO. John has over ten years of experience in both private practice and local authorities. John holds a B.SC in Environmental Science and a M.Sc. in Applied Ecology. Prior to taking up his position with MKO in March 2014, John worked as an Ecologist with Ryan Hanley Consulting Ltd. and Galway County Council. John has specialist knowledge in Flora and Fauna field surveys. Geographic Information Systems, data analysis, Appropriate Assessment, Ecological Impact Assessment and Environmental Impact Assessment. John's key strengths and areas of expertise are in project management. GIS and impact assessment. Since joining MKO John has been involved as a Senior Ecologist on a significant range of energy infrastructure, commercial, national roads and private/public development projects. Within MKO John plays a large role in the management and confidence building of junior members of staff and works as part of a large multi-disciplinary team to produce EIAR Reports. John has project managed a range of strategy and development projects across Ireland and holds CIEEM membership.

Rachel Walsh B.Sc (Hons).

Rachel is a Senior Ecologist with MKO since June 2020. Rachel holds a BSc (Hons) in Environmental Science from National University of Ireland, Galway. Rachel's key strengths are in terrestrial flora and fauna ecology, including vegetation surveys, habitat mapping, invasive species surveys, mammal

surveys, bat surveys and roost site potential assessment, Appropriate Assessment Screening reporting and Ecological Impact Assessment. Since joining MKO, Rachel has worked widely on energy infrastructure, commercial, recreational and residential projects, and plays a role in preparing Ecological Impact Assessment reports and Appropriate Assessment reports. Rachel is trained in carrying out bat surveys, non-volant mammal surveys and in recording vegetation relevées. She also has experience in habitat identification and habitat mapping. Within MKO, Rachel is responsible for independently carrying out and planning ecological field surveys in accordance with NRA Guidelines, carrying out bat surveys in accordance with Scottish Natural Heritage 2019 Guideline standards, habitat surveys, and Appropriate Assessment screenings as part of the ecology team. Rachel is a member of CIEEM and holds a current Bat Roost Disturbance licence.

Aoife Joyce M.Sc. (Agribioscience), B.Sc

Aoife Joyce is a Project Director (Ecology) with MKO Planning and Environmental Consultants with experience in research, consultancy and drilling contractors. Aoife is a graduate of Environmental Science (Hons.) at NUIGalway, complemented by a first-class honours MSc in Agribioscience. Prior to taking up her position with MKO in May, 2019, Aoife worked as an Environmental Scientist with Irish Drilling Ltd. and held previous posts with Inland Fisheries Ireland and Treemetrics Ltd. She has a wide range of experience from bat roost identification, acoustic sampling, sound analysis, soil and water sampling, Waste Acceptability Criteria testing, electrofishing, mammal and habitat surveying to GIS, Environmental Impact Assessments (EIAs) and mapping techniques. Since joining MKO, Aoife has been involved in managing bat survey requirements for a variety of wind farm planning applications, as well as commercial, residential and infrastructure projects. This includes scope development, roost assessments, deploying static bat detectors and weather stations nationwide, dawn and dusk bat detection surveys, sonogram analysis, mapping, impact assessment, mitigation and report writing. Within MKO, she oversees the bat team and works as part of a wider multidisciplinary team to help in the production of ecological reports and assessments. Aoife is a member of Bat Conservation Ireland and CIEEM and holds a current Bat Roost Disturbance license and bat photography license.

Sara Fissolo B.Sc

Sara Fissolo is a Project Ecologist with MKO Planning and Environmental Consultants. She holds a BSc. (Hons) in Ecology and Environmental Biology from University College Cork. Sara is a member of MKO's dedicated bat unit, where she scopes and manages bat survey requirements for a variety of projects, including wind-farms planning applications. She has four years' experience carrying out bat survey requirements including roost assessments, manual/static activity surveys, data analysis, impact assessment and report writing. She is experienced in the use of endoscopes and thermal equipment to carry out bat surveys, as well as site-supervision. She attended Wildlife Acoustics, Bat Conservation Ireland (BCI), Bat Conservation Trust (BCT) and CIEEM courses on surveying heritage buildings for bats, on bats and lighting, on performing bat care, on assessing the impact of developments on bats and on the use of Kaleidoscope Pro Software. Sara is a member of BCI, for which she carries out volunteer surveys, and holds a current Bat Roost Licence from NPWS.

Keith Costello B.Sc (Hons)

Keith Costello was an Ecologist with MKO for 2 years, having joined the company in March 2021. He holds a BSc (Hons) Environmental Science, with a focus on Conservation Ecology. Keith is experienced in a variety of survey techniques including bat and other mammal surveys and has completed training courses in detection dog handling. During his time at MKO, his primary role included deployments of passive bat detectors across a variety of sites, dusk and dawn bat surveys, bat habitat appraisals and inspections, acoustic sonogram analyses, and mapping. He was a member of CIEEM and held a bat roost disturbance licence.

Cathal Bergin B.Sc

Cathal Bergin is a Project Ecologist and conservation detection dog handler and trainer having joined MKO in June 2020. He holds a Bachelor of Science (BSc.) in Wildlife Biology from MTU and diplomas in Canine Behaviour, Dog Training and Canine Nutrition. Cathal is a certified LANTRA accredited conservation detection dog handler and is also training to become an accredited detection dog trainer with experience in identification of bird and bat carcasses. His experience extends to include the deployment of passive bat detectors, dusk and dawn bat surveys, acoustic sampling, bat habitat appraisals and inspections, and plant ID for renewable energy developments. He is a member of CIEEM and holds a current bat roost disturbance licence.

Laura McEntegart B.Sc (Hons)

Laura McEntegart is an Ecologist with MKO, having joined the company in March 2021. Laura holds a BSc (Hons) in Botany and Plant Science from University of Galway in which she studied the species richness, abundance and diversity of pollinators and flowering plants in High Nature Value (HNV) farmland in a Results Based Agri-environment Payment Scheme (RBAPS). She has a wide range of experience from bat roost surveying, acoustic sampling, sound analysis, mammal and habitat surveying and mapping techniques. Since joining MKO, Laura has been involved in roost assessments, deploying passive bat detectors, dusk and dawn bat activity surveys, sonogram analysis, mapping and report writing. She attended Wildlife Acoustics, CIEEM and Bat Conservation Ireland courses on the use of Kaleidoscope Pro Software, Bats Impacts and Mitigation and Bat Trapping and Handling techniques. Laura is a member of CIEEM, Bat Conservation Ireland and Bird Watch Ireland and holds a current Bat Roost Disturbance licence.

Tim Murphy B.Sc (Hons)

Tim Murphy joined MKO as an Ecologist in March 2021 for one year of bat surveying. Tim holds a BSc (Hons) in Environmental Biology at University College Dublin. His experience with MKO primarily lies in bat roost identification, deploying static bat detectors, dawn and dusk bat activity surveys, acoustic sampling, sound analysis, mammal and habitat surveying, GIS mapping techniques, impact assessments, mitigation and report writing. Tim was a member of CIEEM, Bat Conservation Ireland and Bird Watch Ireland and held the relevant Bat Roost Disturbance licence.

Laura Gránicz M.Sc

Laura Gránicz is a Project Ecologist with MKO having joined the bat team in March 2022. Laura holds a Master of Science in Biology from University of Pécs (Hungary) where she graduated in 2017. Prior to taking up her position with MKO, Laura worked as a researcher and assistant project manager in the field of bats in Hungary and in France. She has a wide range of experience connected to bat research and conservation, ranging from roost monitoring, mist netting, acoustic surveys and sound analysis, to conservational project management. Since joining MKO has been primarily involved in bat surveying at pre and post construction renewable energy sites. Surveys include bat roost assessment, passive detector surveys, transect surveys, emergence and re-entry surveys, sound analysis, mapping, mitigation and report writing. She has completed Wildlife Acoustics and BCI training courses in Kaleidoscope Pro analysis and Bat Trapping and Handling techniques. Laura is a member of Bat Conservation Ireland and holds a current Bat Roost Disturbance license.

Shane Connolly B.Sc (Hons)

Shane Connolly joined MKO as a Graduate Ecologist in October 2021 and has over one years' experience in bat surveying. He holds a BSc (Hons) in Botany from University of Galway and has over 15 years' experience in retail/service/landscape industries. During his time at MKO he completed bat roost assessments, deployed static bat detectors, carried out dusk and dawn bat activity surveys, acoustic sound analysis, mammal and habitat surveying, GIS mapping and report writing. Shane was a member of CIEEM, Bat Conservation Ireland and held the relevant Bat Roost Disturbance licence.

Dervla O'Dowd B.Sc. (Env.)

Dervla O'Dowd is an Associate Director with MKO and head of the Ornithology team with over fifteen years of experience in environmental consultancy. Dervla graduated with a first class honours B.Sc. in Environmental Science from NUI, Galway in 2005 and joined Keville O'Sullivan Associates in the same year. Dervla has gained extensive experience in the project management and ecological assessment of the impacts of various infrastructural projects including wind energy projects, water supply schemes, road schemes and housing developments nationwide and has also been involved in the compilation of Environmental Impact Statements, with emphasis on sections such as Flora & Fauna, and acted as EIS co-ordinator on many of these projects. Dervla has also provided site supervision for infrastructural works within designated conservations areas, in particular within aquatic habitats, and has also been involved in the development of environmental/ecological educational resource materials and major ecological surveys of inland waterways. Currently, Dervla is responsible for coordinating ecological work, in particular ornithological surveys required on major infrastructural projects, with emphasis on wind energy projects. Dervla's key strengths and areas of expertise are in project management, project strategy, business development and survey co-ordination to ensure the efficient operation of the Ornithology team's field survey schedule. Dervla holds full membership of the Chartered Institute of Ecology and Environmental Management and current Safe Pass card.

Padraig Cregg M.Sc., B.Sc.

Padraig Cregg is a Principal Ornithologist with MKO with over ten years of experience in both private practice and NGOs. Padraig holds a BSc (Hons) in Zoology and Masters in Evolutionary and Behavioural Ecology. Prior to taking up his position with McCarthy Keville O'Sullivan in December 2018, Padraig worked as a Senior Ornithologist and held previous posts with TOBIN Consulting Engineers, Energised Environments Ltd in Scotland, WSP Environment and Energy Ltd in Scotland and BirdWatch Ireland. Padraig has specialist knowledge in designing, executing and project managing ornithological assessments, primarily in the renewable industry. Padraig's key strengths and areas of expertise are in ornithology and ecology surveying and in writing Natura Impact Statements (NIS) and the Biodiversity chapter of Environmental Impact Assessment Reports (EIAR) to accompany planning applications. Since joining MKO Padraig has been involved in designing, executing and project managing the ornithological assessment on over 20 proposed wind farm developments. He has played a key role in project managing these planning applications through the statutory planning system, with more projects in the pipeline. Within MKO Padraig plays a large role in the management and confidence building of junior members of staff and works as part of a large multi-disciplinary team to produce EIAR and NIS Reports.

Patrick Manley B.Sc.

Patrick Manley is an Senior Ornithologist at MKO. He attended University College Dublin where he completed a BSc (Hons) in Geology. Prior to joining the company in September 2016 Patrick worked as part of the conservation team in BirdWatch Ireland, on projects such as the Dublin bay birds project, Kilcoole Little Tern conservation project and the results based agri-environmental scheme for breeding waders. He has extensive experience surveying birds through other projects such as the Irish wetlands bird survey, the Inishmurray all-island breeding birds survey, the national Hen Harrier survey and the countryside bird survey. Patricks key strengths and areas of expertise are in bird surveying and data management. Since joining MKO Patrick has been involved in a wide variety of bird surveys for wind farms, solar farms and the NPWS.

Susan Doyle PhD, MSc, BA

Susan Doyle is a senior ornithologist at MKO. She completed her primary degree in Zoology (moderatorship in Natural Science) at Trinity College Dublin in 2013 and her master's degree in Ecological Assessment in University College Cork in 2014. Susan has seven years' experience in ecological consultancy and has worked on wind farm projects, solar farm projects, residential developments, data centres, county council projects and National Parks and Wildlife Service projects. She specialises in ornithological consulting, including Environmental Impact Assessments and

operational monitoring. Prior to joining MKO in October 2020, Susan gained experience through her involvement in several bird conservation projects, including protected curlew, seabirds, waders and waterfowl, as well as research into breeding hen harrier, satellite telemetry in migrant birds and avian diseases in Ireland, providing her with extensive experience in a wide variety of bird survey methods, data management and reporting.

Allen Mee

Allen has over 30 years of ornithological field experience in Ireland, UK, and USA. He was the Chairman of Irish Raptor Study Group from 2010-2015. Has actively participated in several major national and international conferences including: EUCAW, Sea Eagle, IRSG annual conferences, the Irish Ornithological Research Conference, American Ornithologists" Union, Society for Conservation Biology, Defenders of Wildlife, Raptor Research Foundation, World Working Group on Bird of Prey. He has also published numerous papers in several peer-reviewed journals. He also spent time searching for target endangered birds in Bolivia, Peru, and the Seychelles.

Athena Michaelides BSc

Athena received her BSc in Zoology from NUI Galway in October 2014. She is highly involved and has volunteered with numerous foundations including, The Vincent Wildlife Trust, Bat Conservation Ireland, and Irish Wildlife Trust. Her key skills include vantage point surveys, winter bird surveys, communication and organization.

Cian Cahalin BSc

Cian is an Ornithologist who took up his position in June 2023. Cian graduated with a Second-Class Honours Grade 1 B.Sc. (Honours) Degree in Wildlife Biology from Munster Technological University (MTU) in 2023. Cian has extensive experience in producing various kinds of scientific reports from his time in MTU. He also gained valuable field work experience with the college acquiring a wide base of knowledge regrading survey techniques and species identification.

Colin Delahunt BSc

Colin was an Ornithologist with MKO who took up his position in June 2019. Colin graduated with an Honours Degree in Environmental Science from National University of Ireland, Galway in 2019. Colin has a wide range of ecological experience including habitat classification, vegetation surveys and small mammal surveys. He has gained extensive experience in numerous GIS systems professionally and academically, with his final year thesis on wintering snipe populations. As part of the ornithology team at MKO, Colin has gained experience in a wide range of bird surveys for windfarm and over-head line developments.

Conor Geoghegan BSc

Conor Geoghegan is an Ornithologist at MKO. He attended National University of Ireland where he completed a BSc (Hons) in Environmental Science. Conor has 1 years' experience working with MKO in bird surveying, report writing and mapping. He has experience in carrying out bird surveys for a variety of proposed windfarm developments and flood relief schemes.

Ciaran McKenna BA (Hons)

Ciarán is a Field Ornithologist with MKO with over 5 years of experience in ecology consultancy. Ciarán holds BA (Hons) in Wildlife Biology. Prior to taking up his position with MKO in March 2018, Ciarán worked as a graduate ecologist with Malachy Walsh and Partners, and was a freelance ecology consultant. Ciarán has knowledge of an array of ecological survey techniques including; mammal, bat, bird, and habitat. Ciarán's key strengths are in the area of ornithological surveys and he has training and experience for rough upland terrain.

Chris Peppiatt

Chris has over ten years' experience in the preparation of ecological/environmental assessments at more than 50 proposed wind energy development sites in 16 Irish counties (Cavan, Clare, Cork, Donegal, Galway, Kerry, Laois, Leitrim, Limerick, Longford, Louth, Mayo, Roscommon, Tipperary, Tyrone and Westmeath). He has also completed sixteen full EIS ecology chapters for proposed wind energy developments as well as AA scoping/NIS where relevant. In addition, he has wide experience with other types of development, including port extension within SPA (birds, Otter, cetaceans, seals), ferry crossings, roads, electricity powerlines, drainage schemes, water schemes, pipelines and buildings development.

Fionn O'Donoghue

Fionn is a keen Birder and wildlife enthusiast for the last 15 years with 4 years' experience in the field in Wildlife filming, along with completing many bird surveys professionally. With countless hours spent in the field he has grown a considerable amount of knowledge with his bird ID skills & animal tracking. Also, he is currently involved in Several Wildlife Productions as a Camera Operator/Assistant & Field Researcher. He is currently Studying Environmental Science in NUI Galway as a mature student (30) where he has maintain a First class Honours Grade point average in the last three years.

Gerry Murphy

In November 2012, Gerry retired from Coillte, (The Irish Forestry Board), after 38 year's employment in several managerial positions. His position held was Director of Forest Operations for Coillte Forest for the provenances of Munster and Leinster. Since January 2013, he has worked as an independent ecological contractor undertaking field bird surveys for environmental consultancy companies. He also holds membership in Birdwatch Ireland, Wildfowl and Wetlands Trust, Society of Irish Foresters (serving on the council), Irish Brent Goose Research Group (Chairperson), Irish Whooper Swan Study Group (Chairperson), Irish Seed Savers Association, and Society of Irish Foresters

Ian Hynes BSc

Ian Hynes was an Ornithologist with MKO, from 2017 to 2023. Ian holds a B.Sc. (Hons) in Environmental Science from National University of Ireland, Galway. Ian has a broad knowledge of ecology including SNH bird surveys and identification, invertebrate surveys and identification, vegetation surveys, mammal surveys and habitat identification. Ian also has over 6 years of experience using GIS software systems including ArcGIS and QGIS and MapInfo to present ecological data. As part of his final year thesis Ian gained valuable experience in report writing, data input, invertebrate and plant identification. Ian also liaised with members of the AranLIFE project and local landowners on Inis Oirr, Aran Islands in the summer of 2016 while completing his thesis. Ians key strengths are in Data management and GIS/MapInfo software. Since joining the Ornithology team at MKO, he has been involved in a number of windfarm projects, utilizing his skills to undertake bird surveys, compile data, write reports and create maps for surveys and figures.

Jonah Gaine BSc

Jonah is an Ornithologist who took up his position in May 2021. Jonah graduated with a Second Class Honours B.Sc. Honours Degree in Field Biology and Wildlife Tourism from the Institute of Technology Tralee in 2020. Jonah has experience in producing detailed scientific reports. During his time at ITT, Jonah has gained valuable practical skills necessary for vegetation, mammal, and bird surveying.

Katie Grice BSc

Katie recently graduated from University College Cork with a degree in zoology and is now working with MKO as a graduate ornithologist. Her main interests are ornithology and conducting bird surveys and has several years of birdwatching experience in Ireland as well as field skills developed during her degree. As a hobby she also enjoys insect and plant id. Prior to her entry into the MKO Graduate

Program, Katie worked during the as a summer intern, where she had her first experiences doing bird surveys on her own, conducting breeding woodcock surveys throughout the summer to detect displaying male birds.

Louis De Vries MSc

Louis moved to Ireland a year ago to work as an Ornithologist at MKO. He is passionate about birds and marine life and their conservation. Louis holds a master's degree in Ecology and Ethology from Université Jean Monnet (Saint-Etienne France) and has worked as a project manager on cetaceans conservation for 3 years, leading multiple projects aiming to reduce ship strikes between marine mammals and commercial shipping. He has also led scientific data collection (cetaceans and birds) during boat-based surveys.

Marcus Hogan

Marcus has been working for MKO as a field ornithologist for the past year having previously been a researcher in the college of medicine in University of Galway. When he's not working with MKO he spends his time volunteering with the Irish Whale and Dolphin Group where he has been using drones to ID and measure humpback whales.

Margeaux Pierrel MSc

Margaux Pierrel was an Ornithologist with MKO from 2019 to 2022. Margaux has over 5 years of experience in both private practice and public authorities. Margaux holds an engineering diploma (M.Sc.) from the National Engineering School of VetAgro Sup, Clermont-Ferrand (France) with a specialisation in environment, rural development and agronomy. Prior to taking up her position with MKO in September 2019, Margaux worked as an ecologist with Inis Environmental Ltd. and held previous posts with the National Parks and Wildlife Service, Vincent Wildlife Trust and Wildlife Sense (Greece). Margaux is a field engineer with specialist knowledge in providing ecological input into a range of development projects, undertaking ornithological and bat surveys and processing data in line with best practice. Margaux's key strengths and areas of expertise are in ornithological and ecological surveys, project co-ordination and report writing. Since joining MKO, Margaux has been involved in writing EIARs, liaising with clients and sub-contractors regarding billing plan and survey coordination and carrying out ornithological surveys on energy infrastructure sites, generally windfarms projects.

Mike Sylvia BSc

Mike has a Bachelor of Science degree in Fisheries and Wildlife Biology and has spent his career developing his excellent bird identification skills through physical features and vocalizations. Mike has field work experience through the National Red-billed Chough Survey, and has performed numerous surveys including waterfowl, breeding walkovers, and offshore ship-based surveys. He was also a project manager collecting breeding bird and mammal density information in various remote locations on the Aleutian Islands in Alaska.

Nessa Lee BSc

Nessa Lee is a Project Ornithologist at MKO. She attended National University of Ireland where she completed a BSc (Hons) in Environmental Science. Nessa has almost 2 years' experience working with MKO in data management, viewshed analysis, bird surveying and mapping to name a few. Nessa is also responsible for sub-contractor management within the ornithology team. She has experience in carrying out bird surveys for a variety of proposed windfarm developments, as well as experience in bird monitoring at operational windfarms.

Peter Capsey

Peter is an Ornithologist with MKO having joined the company in September 2020. Peter holds a BA in Modern Languages and Information Systems. Peter's key strengths and expertise are bird identification and the completion of ornithological surveys. Peter also has extensive project

management experience from previous employment in the IT sector. Since joining MKO, Peter has been involved in a range of windfarm projects. In his role as an ornithologist, Peter works mostly in the field on ornithological surveys, and then compiles monthly reports summarising the findings from these surveys.

Sean O'Brien BSc

Sean is a graduate field ornithologist at MKO with experience conducting a broad range of bird surveys for proposed windfarm developments as well as experience in bird monitoring at operational windfarms. Prior to taking up his position at MKO in April 2021 Sean gained extensive bird survey experience by volunteering for the NPWS where he assisted in waterfowl research and monitoring, as well as aquatic plant monitoring. Sean also has ornithological experience from volunteering for the Irish Wetlands Bird Survey (I-WeBS) monitoring scheme. He has also volunteered for Bat Conservation Ireland. Sean graduated with an Honours Degree in Environmental Science from University College Cork in 2019. Sean also has experience in health and safety from working as an assistant health and safety officer on a busy pharmaceutical construction site and is certified by IOSH in managing safely. Sean is also currently on the path to getting a Level 8 Certificate in digital mapping and QGIS. Sean's key strengths and areas of expertise are bird ecology and identification, fieldwork, health and safety, and GIS.

Tony Kenneally BSc

Tony's area of expertise is as a bird surveyor, and has experience surveying for a range of target species including: Hen Harrier, Peregrine, Barn Owl, waders and wildfowl. Recent bird survey work includes a range of bird surveys on proposed onshore wind farm developments including VP surveys, breeding raptor, breeding and wintering wader and wildfowl surveys, Hen Harrier roost watches. All of his bird survey work and methodology are carried out to SNH standards. He also has a BSc (Hons) degree in Wildlife Biology, where his course included the opportunity to participate individual and team projects, field reports, commentaries, management plans and statistical analyses. In addition, data collection methods including, terrestrial and aquatic survey methods, transects, behavioural observations, habitat mapping skills and GIS, were all a large part of his course.

Tom Ryan BSc

Tom Ryan was a Project Ornithologist with MKO with extensive practical experience in field research. At MKO, Tom oversees a team of ornithologists. Tom holds a BSc (Hons) in Environmental & Natural Resource Management and is currently working towards a master's in Environmental Management with GIS. Prior to taking up his position with MKO in September 2016, Tom worked as part of the Wildlife Unit of the Department of Agriculture as part of his degree. Tom has taken part in voluntary bird surveys as well as ongoing recording of mammal species. Tom's key strengths and areas of expertise are in bird ecology & identification, GIS, project planning, mammal ecology & identification and fieldwork skills. Since joining MKO Tom has been involved as an Ornithologist on several wind energy developments, utilising a broad range of bird survey methodologies including breeding raptor, adapted brown & shepherd and waterfowl distribution surveys. He is very skilled at detecting Annex 1 and red listed bird species in a broad range of habitats. Within MKO Tom plays an important role as part of the Ornithology team, working independently, managing several projects, and planning field surveys in accordance with required standards. Tom has managed the ornithological surveying at wind energy developments, engaging with and reporting to clients as well as liaising with sub-contractors and management.

Zuzana Erosova BSc

Zuzana graduated with BSc in Wildlife Biology from IT Tralee, now called MTU, in 2019. In summer season of 2019, she worked for Envirico as graduate ecologist doing habitat surveys in Killarney National Park and Blasket Islands. She also helped with Manx Shearwater surveys on Blasket Islands. After that I worked as environmental sampling technician for CLS. In 2021 Zuzana worked as temporary consultant ecologist for Scott Cawley Ltd., where she mainly conducted bat surveys and did bat call analysis. She has also done some habitat and bird surveys. From January 2022 she works as

ornithologist for MKO conducting a range of ornithological surveys, write interim reports and end of season reports, and do data input and management. Zuzana also volunteers for Birdwatch Ireland doing I-Webs surveys, and occasionally do voluntary work for Bat Conservation Ireland and Vincent Wildlife Trust Ireland.

Zak O'Connor BSc

Zak is an ornithologist who took up his position with MKO in January 2022. At first, Zak was primarily involved with data management and mapping for projects but transitioned to a full-time field ornithologist in October 2022. Prior to taking up his position with MKO, Zak worked with Inland fisheries Ireland, gaining a wealth of skills and training in relation freshwater species and their management. Zak has experience in relation to report writing throughout college and in previous roles. Zak graduated from the University of Galway in 2020 with B.Sc. in Zoology.

Ellen Costello B.Sc (Hons); M.Sc (Hons)

Ellen Costello is a Project Environmental Scientist with MKO with over three years of experience in private consultancy. Ellen holds a BSc (Hons) in Earth Science, and a MSc (Hons) in Climate Change: Integrated Environmental and Social Science Aspects where she focused her studies on renewable energy development in Europe and its implications on environment and society. Ellen's key strengths and expertise are Environmental Protection and Management, Environmental Impact Statements, Project Management, and GIS Mapping and Modelling. Since joining MKO, Ellen has been involved in a range of renewable energy infrastructure projects. In her role as a project manager, Ellen works with and co-ordinates large multidisciplinary teams including members from MKO's Environmental, Planning, Ecological and Ornithological departments as well as sub-contractors from various fields in the preparation and production of EIARs.

Catherine Johnson B.Sc, LLM

Catherine is a Climate Practitioner and Environmental Scientist with MKO with over one year of private consultancy experience and expertise in climate and sustainability matters. Catherine holds a BSc in Earth and Ocean Science and a LLM in Global Environment and Climate Change Law. Prior to joining MKO in 2022, Catherine worked as an Environmental Social Governance (ESG) analyst for Acasta in Edinburgh. Catherine has expertise regarding international climate law and policy, earth processes, ocean science, and sustainability/ESG. Catherine has been involved in a myriad of environmental service offerings at MKO including EIA Screenings and Reports, climate and sustainability related work and renewable energy infrastructure projects.

Jack Workman MSc

Jack is the Landscape & Visual Project Director at MKO and is chartered as a Technician Member of the British Landscape Institute. Jack is a Landscape and Visual Impact Assessment Specialist with an academic background in the field of Environmental Science and Geography. Jack's primary role at MKO is conducting Landscape and Visual Impact Assessment (LVIA) for Environmental Impact Assessment reports, as well as supporting the MKO graphics, CAD and drone surveying teams. Jack holds a BSc. in Psychology, and an MSc. in Coastal and Marine Environments (Physical Processes, Policy & Practice) where he was awarded the Prof. Máirín De Valéra distinction in science research award. Prior to taking up his position with MKO, Jack worked as a Geospatial Analyst and Research Assistant with the University of Galway and also held previous posts in the coastal engineering sector with Royal Haskoning DHV and Saltwater Technologies. Since joining MKO in February 2020, Jack has conducted and project managed all aspects of LVIA for a broad range of commercial infrastructure developments including wind and solar energy projects, grid infrastructure, extraction industry and Strategic Housing Developments. Jack holds a membership with the Chartered Institute of Water and Environmental Management and is also a member of the Landscape Research Group..

Jack Smith BCL (Hons), LLM; MSc (Hons)

Jack Smith is a Project Environmental Scientist and Landscape and Visual Impact Assessment (LVIA) Specialist with MKO, he took up his position in May 2021, upon completion of his MSc. in Environmental Leadership from NUIG. Jack is an Affiliate member of the British Landscape Institute and holds membership with the Landscape Research Group. Jack is also a Practitioner member of the Institute for Environmental Management and Assessment. Jack's key strengths and expertise lie in conducting Landscape and Visual Impact Assessments (LVIA) (both as standalone reports and as part of the preparation of Environmental Impact Assessment Reports (EIAR)), GIS Mapping and Analysis, and Project Management. Jack specialises in preparing Landscape and Visual Impact Assessment Reports for large-scale renewable energy projects including wind farms, solar farms, as well as a range of other projects such as large-scale habitat restoration schemes, quarry extraction and large-scale housing schemes. In addition, Jack has experience in preparing strategic level and project level landscape feasibility reports for large wind farm projects. Jack also has legal and regulatory knowledge and expertise due to his LL.M. in International Environmental and Energy Law.

Matthew Davis BA; M.Sc;

Matthew Davis is an Environmental Scientist and part of the Graduate Program with MKO, having joined the company in May 2023. Matthew holds an M.Sc. in Coastal and Marine Environments (Physical Processes, Policy & Practice) from the University of Galway and a BA degree in Geography from California State University of Long Beach, with a focus on Human and Cultural Geographic Theory. He is part of the Landscape and Visual Impact Assessment (LVIA) team with primarily responsibility for writing the LVIA chapter of an Environmental Impact Assessment Report. Since working for MKO, Matthew has worked on renewable energy and commercial projects.

Joseph O'Brien

Joseph O'Brien holds the position of CAD Technician. Joseph holds a BA Honours Level 8 Modelmaking, Design and Digital Effect, Institute of Art Design and Technology (IADT), Dun Laoghaire & City & Guilds Level 3 2D &3D AutoCAD certificates. Joseph's role entails various wind and solar farm projects which require various skills such as mapping, aerial registration and detailed design drawings for projects. Prior to joining us, Joseph worked as a free-lance Modelmaker and CAD Technician. His previous experience included designing various models and props through CAD and then making them for various conventions such as Dublin Comic Con and Arcade Con.

Killian Devereux BSc (Hons)

Killian is a CAD Technician at MKO with over 6 years of drafting experience in various sectors of the building industry. He holds BSc (Hons) in Architectural Technology from Galway Mayo Institute of Technology. Prior to taking up his position with MKO in October 2022, Killian worked as a Structural CAD/BIM Technician for Tobin Consulting Engineers and as an Architectural Technician for some small-scale Consultants. He was primarily involved in a variety of Commercial / Residential projects where he was responsible for the structural drawing packages but also has experience working in RC concrete Drawings, Architectural and Civil drawings, FSC's /DAC's and one-off housing planning applications. His key strengths and areas of expertise are in Auto CAD, Revit, Cads RC and Google Sketch up.

1.8.2.2 Hydro Environmental Services Ltd

Hydro-Environmental Services (HES) is a specialist hydrological, hydrogeological and environmental practice which delivers a range of water and environmental management consultancy services to the private and public sectors across Ireland and Northern Ireland. HES was established in 2005, and our office is located in Dungarvan, County Waterford. HES have substantial experience in a broad range of environmental consultancy areas, including: site investigations and environmental monitoring; contaminated land investigations and site remediation; environmental risk assessments; environmental impact statements; karst hydrology and hydrogeology; peatland/wetland and river hydrology;

wastewater engineering, surface water drainage and SUDS (sustainable urban drainage systems) design; flood risk assessments; hydrogeological investigations; and surface water/groundwater interactions.

Michael Gill

Michael Gill is an Environmental Engineer with over eighteen years' environmental consultancy experience in Ireland. Michael has completed numerous hydrological and hydrogeological impact assessments of wind farms in Ireland. He has also managed EIA/EIS assessments for infrastructure projects and private residential and commercial developments. In addition, he has substantial experience in wastewater engineering and site suitability assessments, contaminated land investigation and assessment, wetland hydrology/hydrogeology, water resource assessments, surface water drainage design and SUDs design, and surface water/groundwater interactions.

David Broderick

David Broderick is a hydrogeologist with over thirteen years' experience in both the public and private sectors. Having spent two years working in the Geological Survey of Ireland working mainly on groundwater and source protection studies. David moved into the private sector. David has a strong background in groundwater resource assessment and hydrogeological/hydrological investigations in relation to developments such as quarries and wind farms. David has completed numerous geology and water sections for input into EIARs for a range of commercial developments.

1.8.2.3 Fehily Timoney

The geotechnical aspects of the report, which were incorporated into the Geology & Soils and Water sections of the EIAR, were completed by Fehily Timoney. Fehily Timoney has extensive experience in the production of Peat Stability Assessments for wind energy developments. Fehily Timoney provides specialist geotechnical engineering and engineering geology advice to local authorities, contractors and consultants, particularly for infrastructure projects forming part of the National Development Plan and also for private commercial and residential developments as they move on to sites with more complex ground conditions.

Ian Higgins

Ian is a geotechnical engineer with over 18 years' experience in the design and supervision of construction of bulk earthworks, geotechnical foundation design, geotechnical monitoring and reviewing, reinforced earth design and 3rd party checking of piling and ground improvement designs. Ian's experience also includes the design, supervision and interpretation of ground investigations, including desk studies, walkover surveys, hazard mapping of rock excavations and slopes.

Ian has experience in many areas of civil engineering including highways, railways, energy projects and commercial developments. Ian's responsibilities include managing junior engineers, reviewing work carried out for ground investigation, reporting and design. Ian has also experience in using a number of geotechnical software packages including slope stability, finite element, pile design and retaining wall design.

1.8.2.4 AWN Consulting Ltd

AWN Consulting is a multidisciplinary engineering consultancy offering specialist design advice in respect of all aspects of environmental acoustics. It is an Irish owned company with its Head Office in Dublin. AWN Consulting's acoustics team comprises nine suitably qualified engineers with a total of some 100 man years spent working in the area, making it the largest and most experienced group of its type in Ireland, uniquely positioned to undertake a wide variety of projects.

Dermot Blunnie - Senior Acoustic Consultant

Dermot Blunnie (Senior Acoustic Consultant) holds a BEng in Sound Engineering, MSc in Applied Acoustics and has completed the Institute of Acoustics (IOA) Diploma in Acoustics and Noise Control. He has been working in the field of acoustics since 2008 and is a member of the Institute of Engineers Ireland (MIEI) and the Institute of Acoustics (MIOA). He has extensive knowledge of all aspects of environmental surveying, noise modelling and impact assessment for various sectors including, energy, industrial, commercial and residential. Dermot specialises in wind farm noise modelling, compliance and complaint investigations.

Mike Simms- Senior Acoustic Consultant

Mike Simms (Senior Acoustic Consultant) holds a Bachelor of Mechanical Engineering and Master of Engineering Science from University College Dublin he also holds a Diploma in Acoustics and Noise Control from the University of Ulster at Jordanstown. He has 16 years' experience in the field of environmental acoustics, in particular using computer-based noise modelling for environmental noise assessments..

1.8.2.5 Tobar Archaeological Services

Tobar Archaeological Services is a Cork-based company in its 17th year in business. They offer professional nationwide services ranging from pre-planning assessments to archaeological excavation, and cater for clients in state agencies, private and public sectors.

Tobar's Directors, are licensed by the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs to carry out excavations in Ireland and have carried out work directly for the National Monuments Services of the Department of the Environment, Heritage and Local Government. Tobar Archaeological Services has a proven track record and extensive experience in the wind farm industry from EIS/EIAR stage through to construction stage when archaeological monitoring is frequently required.

Miriam Carroll is a partner of Tobar Archaeological Services which was established in 2003. Prior to that Miriam worked in the field of commercial archaeology for five years in University College Cork where she completed her primary and Masters degrees. Miriam has over 24 years of experience in the field of archaeology, with 19 of those as partner of Tobar Archaeological Services. She is a full member of the Institute of Archaeologists of Ireland (IAI) and is licensed by the National Monuments Service to carry out excavations in Ireland.

Miriam undertook her primary degree in Archaeology (major) and English (minor) between 1993 and 1996. Her Master's degree was also undertaken in University College Cork. This was a 2 year course in Irish Archaeology. The subject of Miriam's thesis focused on 'Ballyalton Bowls' (prehistoric pottery) in the context of the Irish Neolithic. This Master's degree was undertaken between 1996 and 1998. Miriam then went on to work in commercial archaeology in the Archaeological Services Unit of University College Cork for 5 years after which both Annette Quinn and Miriam set up the business Tobar Archaeological Services in 2003.

She is a full member of the Institute of Archaeologists of Ireland (IAI) and is licensed by the National Monuments Service to carry out excavations in Ireland. Miriam has overseen numerous commercial projects in Ireland including wind, solar and overhead line projects. Miriam was the project archaeologist for the Bandon Sewerage Scheme which lasted a number of years. This required a high-level of experience and organization as well as the resolution of parts of the 17th century town wall and other additional significant finds in a timely and efficient manner. Miriam also successfully managed a major excavation in Buttevant, Co. Cork for the Cork Education and Training board as well as being the project archaeologist for Fota Wildlife park extension from 2014. This involved project management of a large team of archaeologists on a medieval settlement site.

Miriam has also undertaken numerous EIARs and has presented evidence at numerous Oral Hearings for bodies such as Eirgrid.

1.8.2.6 Alan Lipscombe Traffic and Transport Consultants

Alan Lipscombe

In January 2007 Alan Lipscombe set up an independent traffic and transportation consultancy providing advice for a range of clients in the private and public sectors. Prior to this Alan was a founding member of Colin Buchanan's Galway office having moved there as the senior transportation engineer for the Galway Land Use and Transportation Study. Since the completion of that study in 1999, Alan has worked throughout the West of Ireland on a range of projects including: major development schemes, the Galway City Outer Bypass, Limerick Planning Land-Use and Transportation Study, Limerick Southern Ring Road Phase II, cost benefit analyses (COBA) and various studies for the NUI Galway. Before moving to Galway in 1997, Alan was involved in a wide variety of traffic and transport studies for CBP throughout the UK, Malta and Indonesia. He has particular expertise in the assessment of development related traffic and transport modelling, including for numerous wind farm developments, and is an accomplished analyst who has experience of a wide variety of modelling packages and methods.

1.8.2.7 Ai Bridges Ltd

Ai Bridges has been supplying telecommunications and aviation assessment solutions to the wind farm industry throughout the Republic of Ireland, Northern Ireland and the rest of the UK since 2007. The Ai Bridges Engineering Department has in excess of 170-man years of experience in the delivery of Aviation, Telecommunications, Broadcast & Electromagnetic Interference projects.

Kevin Hayes is the Engineering Director at Ai Bridges and takes the role of Client Relationship Manager responsible for oversight of project progress and deliverables for the Telecommunications and Aviation Impact Assessment Projects and acts as client liaison. Kevin also takes responsibility for day-to-day running of the project including co-ordination of project team, sub-contractors and achieving agreed milestones. All project works are managed by Kevin who is a qualified engineer with B.Eng. Hons. Electronic & Communications Engineer, M. Eng. Hons in Communications & Software Engineering qualifications. Kevin has gained extensive experience in the areas of Telecommunications network design, deployment of telecommunications systems over a 32-year period. He has extensive working knowledge of software modelling and radio planning of telecommunications and aviation systems. Kevin has also taken the lead role in developing the Ai Bridges 3D modelling software techniques used to predict wind farm and solar park interference impacts on telecommunications, broadcast and aviation infrastructure networks.

1.8.2.8 Cyrrus Ltd

Cyrrus Limited were contracted by Ai Bridges on behalf of the applicant to address the IAA request for detailed technical IFP and Radar Assessments. Cyrrus Limited is an IAA Approved Procedure Designer Organisation. Cyrrus provides specialized Radar Engineering & Consultancy Services and IFP Assessments and IFP Procedure Design Services. Cyrrus have relevant experience in the areas of UUK Civil Aviation and MoD Radar Assessments.

Shaun Gouvera conducted the IFP Assessments and Kevin Sissons completed the Radar Assessments.

1.8.2.9 Digital Land Surveyors Ltd

The Autotrack Analysis was prepared by William Gallagher (B.Eng. Civil Eng.) of Digital Land Surveyors Ltd. William is a competent expert in Transport Assessments using Autotrack Analysis and Digital Topographical Surveys with over 20 years' experience in the field. William has been working at

Digital Land Surveyors as a surveyor since 2003 and has continuously updated software/software training and surveying equipment to ensure all data used for Autotracking is up to date. He has also commissioned bespoke drawings from the software provider for the most up to date trailer configurations, with data provided by the trailer manufacturer. William has provided advice for a range of clients in the private and public sectors. William has worked on various transport studies for all the major wind farm developers in Ireland and he has also carried out transport studies in the UK, Romania, Morocco and Bulgaria. William has particular expert experience in the vertical alignment analysis of roads to be used for wind farms.

1.8.2.10 Collett & Sons Ltd

The Primary Route Assessment for Knockshanvo Wind Farm was prepared by Steven Mangham of Collett & Son, Halifax, West Yorkshire, UK. Collett & Son owns a fleet of over 60 vehicles and 100 trailers and is one of the main transport contractors who deliver wind turbine components to Ireland. They also provide consultancy services in relation to the assessment of turbine haul routes. Steven also oversaw the preparation of the Swept Path Analysis drawings for the turbine haul route between the Port of Foynes and Knockshanvo Wind Farm. Mr. Mangham has a BTech in Civil Engineering from Leeds College of Building and a BSc in Civil Engineering from Leeds Beckett University. He has been employed by Collett & Son for over 12 years and is their Consultancy Manager. He has been involved in transport assessments for over 250 wind farms in the UK and for over 40 wind farms in Ireland.

1.9 Difficulties Encountered

There were no technical difficulties encountered during the preparation of this EIAR.

1.10 Viewing and Purchasing of the EIAR

Copies of this EIAR will be available online for the planning application, including the Non-Technical Summary (NTS), on the Planning Section of the An Bord Pleanála website, under the relevant Planning Reference Number (to be assigned on lodgement of the application).

An Bord Pleanála: http://www.pleanala.ie/

This EIAR and all associated documentation will also be available for viewing at the offices of An Bord Pleanála, and Clare County Council. The EIAR may be inspected free of charge or purchased by any member of the public during normal office hours at the following address:

An Bord Pleanála,
64 Marlborough Street,
St. Rotunda,
Dublin 1

Clare County Council
Áras Contae an Chláir
New Road
Ennis
Co. Clare
V95 DXP2

The EIAR will also be available to view online via the Department of Planning, Housing and Local Government's EIA Portal, which will provide a link to the planning authority's website on which the application details are contained. This EIA Portal was recently set up by the Department as an electronic notification to the public of requests for development consent which are accompanied by an

EIAR. (https://www.housing.gov.ie/planning/environmental-assessment/environmental-impact-assessment-eia/eia-portal)

The EIAR will also be available to view online on its dedicated SID website:

www.knockshanvowindfarm.ie

www.knockshanvoplanning.ie

www.knockshanvogridplanning.ie