Environmental Impact Assessment Report

Proposed Croagh Wind Farm, Co. Leitrim and Co. Sligo

Volume 1

Non-Technical Summary and Main Report

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NON-TECHNICAL SUMMARY

Introduction

This Environmental Impact Assessment Report (EIAR) has been prepared by MKO on behalf of Coillte who intends to apply to Sligo County Council and Leitrim County Council for planning permission for a proposed wind farm development located on north-eastern slopes of Carrane Hill on the boundary of Counties Leitrim and Sligo.

The townlands in which the wind farm site, ancillary works and grid connection are located, are listed in Table 1.

Table 1 Townlands within which the proposed development is located

Townland	
Co. Leitrim	**Co. Sligo**
Bargowla	Carrowmore
Boleymaguire	Carrownyclowan
Braudphark	
Derreens	
Derryboffin	
Derrycullinan	
Derrycullinan Beg	
Drummanacappul	
Garvagh	
Garvagh Glebe	
Glassalt	
Lisfuiltaghan	
Seltan	
Sheena	
Tinnybeg	

This EIAR complies with the EIA Directive 2011/92/EU as amended by Directive 2014/52/EU. The Environmental Impact Assessment (EIA) of the proposed project will be undertaken by Leitrim County Council and Sligo County Council, as the competent authorities.

Applicant

Coillte have been involved in the development of 4 operating wind farms including Raheenleagh (Wicklow), Sliabh Bawn (Roscommon), Cloosh (Galway) and Castlepook (Cork) which have a combined total capacity of over 300 megawatts (MW). This project is part of a wider Coillte ambition to support the delivery of a further 1 GW of renewable energy and therefore make a significant contribution to the ambitions outlined in the All of Government Climate Action Plan 2019.

Brief Description of the Proposed Development

The proposed development comprises the construction of 10 No. wind turbines and all associated works. The proposed turbines will have a blade tip height of up to 170metres above the top of the foundation. The applicant is seeking a ten-year planning permission. The full description of the proposed development, is as follows:

i. *Construction of up to 10 No. wind turbines with a maximum overall blade tip height of up to 170 metres, and associated hardstand areas;*
ii. *1 no. 38kV permanent electrical substation including a control building with welfare facilities, all associated electrical plant and equipment, security fencing, all associated underground cabling, wastewater holding tank and all ancillary works;*
iii. *1 no. permanent Meteorological Mast with a maximum height of up to 100 metres;*
iv. *All associated underground electrical and communications cabling connecting the turbines to the proposed wind farm substation;*
v. *All works associated with the connection of the proposed wind farm to the national electricity grid, via underground cabling to the existing Garvagh substation;*
vi. *Upgrade of existing tracks and roads, provision of new site access roads and hardstand areas;*
vii. *The partial demolition and alteration of two agricultural buildings in the townlands of Sheena and associated junction access road works in the townlands of Sheena and Derrybofin to provide a link road for construction traffic off the R280;*
viii. *1 no. borrow pit;*
ix. *2 no. peat and spoil repository areas*
x. *2 no. temporary construction compounds;*
xi. *Recreation and amenity works, including marked trails, boardwalk and viewing area provision of a permanent amenity car park, and associated recreation and amenity signage*
xii. *Site Drainage;*
xiii. *Permanent Signage;*
xiv. *Forestry Felling; and*
xv. *All associated site development works*

This application is seeking a ten-year permission and 30 year operational life from the date of commissioning of the renewable energy development.

Modern wind turbine generators typically have an output of between 3.0 and 5MW. For the purposes of this EIAR it is assumed that the wind turbine model installed as part of the proposed renewable energy development will have a rated output of 4.8MW. Therefore, based on 10 no. wind turbines, the proposed wind turbines will have a combined output of approximately 48MW and no greater than 50MW.

Need for the Proposed Development

It is now clear that Ireland will not meet its 2020 target for renewable energy, with the Sustainable Energy Authority of Ireland (SEAI) reporting in May 2019 that 13 per cent of Ireland's energy will

come from renewable sources by 2020, three per cent short of our European target of 16 per cent (SEAI, May 2019). Ireland faces significant challenges to its efforts to meet EU targets for renewable energy by 2030 and its commitment to transition to a low carbon economy by 2050. Further detail can be found in Section 2.3.3 of this EIAR.

In March 2019, the Government announced a renewable electricity target of 70% by 2030. The proposed development is likely to be operational before 2030 and would therefore contribute to this 2030 target. More recently, the EPA reported that Ireland is set to fall far short of all of its carbon emissions reduction targets for 2030, despite climate action measures in the National Development Plan (EPA, June 2019). As such, the proposed Croagh wind energy development is critical to helping Ireland address these challenges as well as addressing the country's over-dependence on imported fossil fuels.

The Climate Action Plan 2019 (CAP) was published on the 1st of August 2019 by the Department of Communications, Climate Action and Environment (DoCCAE). The CAP sets out an ambitious course of action over the coming years to address the impacts which climate change may have on Ireland's environment, society, economic and natural resources. This Plan clearly recognises that Ireland must significantly step up its commitments to tackle climate disruption. The CAP identifies a need for 8.2GW of onshore wind generation. Only 3.7GW is in place as of December 2019, therefore Ireland needs to more than double its installed capacity of wind generation. The CAP presents clear and unequivocal support for the provision of additional renewable energy generation and presents further policy support for increased wind energy. Further information relating to the Climate Action Plan can be found in Chapter 2, Section 2.4.5.

Section 2.4 in Chapter 2 of this EIAR on Background to the Proposed Development, presents a full description of the international, national and regional renewable energy policy context for the proposed project. Section 2.4 addresses climate change, including Ireland's current status with regard to meeting greenhouse gas emission reduction targets.

Economic Benefits

The proposed development will have several significant long-term and short-term benefits for the local economy including job creation, local authority commercial rate payments and a Community Benefit Scheme.

The annual commercial rate payments from the proposed development to Leitrim and Sligo County Councils, will be redirected to the provision of public services within those counties. These services include items such as road upkeep, fire services, environmental protection, street lighting, footpath maintenance etc. along with other community and cultural support initiatives.

It is estimated that the proposed project will create approximately 80-100 jobs during the construction phase and 2-3 jobs during the operational and maintenance phases of the proposed development. During construction, additional employment will be created in the region through the supply of services and materials to the development. In addition to this, there will also be income generated by local employment from the purchase of local services i.e. travel and lodgings.

Should the proposed development receive planning permission, there are substantial opportunities available for the local area in the form of Community Benefit Funds. Based on the current proposal, a Community Benefit Fund in the region of €5 million will be made available over the lifetime of the project. The value of this fund will be directly proportional to the energy produced at the site and the premise of the fund is that it should be used to bring about significant, positive change in the local area. Further details on the proposed Community Gain proposals are presented in Section 4.5 and Appendix 2-2 of this EIAR.

The Renewable Energy Support Scheme (RESS) sets out that future renewable energy project proposals enable the possibility for local communities to invest in projects in a meaningful way as a means to

directly gain from the financial dividends that a project can provide. Coillte aim to work with the community during 2020/2021, to continue to explore this exciting possibility and see how best to embed its design within the community

Purpose and Structure of this EIAR

The purpose of this EIAR is to document the current state of the environment in the vicinity of the proposed development site and to quantify the likely significant effects of the proposed development on the environment. The EIAR submitted by the applicant provides the relevant environmental information to enable the Environmental Impact Assessment (EIA) to be carried out by the competent authority, in this case Leitrim & Sligo County Councils.

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

1. *Introduction*
2. *Background to the Proposed Development*
3. *Consideration of Reasonable Alternatives*
4. *Description of the Proposed Development*
5. *Population and Human Health*
6. *Biodiversity*
7. *Ornithology*
8. *Land, Soils and Geology*
9. *Hydrology and Hydrogeology*
10. *Air and Climate*
11. *Noise and Vibration*
12. *Landscape and Visual*
13. *Archaeological and Cultural Heritage*
14. *Material Assets (including Traffic and Transport, Telecommunications and Aviation)*
15. *Interactions of the Foregoing*
16. *Schedule of Mitigation*

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

Background to the Proposed Development

This chapter of the Environmental Impact Assessment Report (EIAR) presents information on renewable energy and climate change policy and targets, the strategic planning context for the proposed development, the site selection and design process, a description of the proposed development site and planning history, the assessment of reasonable alternatives, scoping and consultation, and the cumulative impact assessment process.

Energy and Climate Change Targets

Renewable energy development is recognised as a vital component of Ireland's strategy to tackle the challenges of combating climate change and ensuring a secure supply of energy. The June 2018 'Off Target Report' published by the Climate Action Network (CAN) Europe, which ranks EU countries ambition and progress in fighting climate change, listed Ireland as the second worst performing EU member state in tackling climate change. It also stated that Ireland is set to miss its 2020 climate and renewable energy targets and is also off course for it's unambitious 2030 emissions target.

The Department of Climate Change, Action & Environment (DCCAE) reported in their 'Fourth Progress Report on the National Renewable Energy Action Plan' December 2017 that Ireland will achieve 13% of its 16% RES target by 2020. SEAI in their report 'Ireland's Energy Targets – Progress, Ambition & Impacts' (April 2016) estimates that Irelands inability to achieve its 2020 renewable energy targets will result in fines of between €65 million and €130 million per percentage shortfall on its overall binding target after 2020 until it meets its targets. The latest data available from Eurostat show that as of the 2018 figures, Ireland is still considerably below meeting its 16% target and at the end of 2018 sat at 11.1%.

The SEAI's 'Energy in Ireland 2019' report provides the most up to date figures available (from 2018) in relation to energy production and consumption in Ireland. The 2019 report found that wind generation accounted for 28.1% (normalised) of all electricity generated, further, wind energy accounted for 84% of the renewable energy generated in 2018. In relation to the findings of this SEAI report it is clear that wind energy represents the strongest and most deployable renewable energy resource available to reduce dependence on fossil fuels in Ireland. While it is clear that additional deployment is on-going, it is also apparent that it is unlikely that the 2020 targets for renewable electricity generation will be met.

Local Policy

The site of the proposed development occurs along the Leitrim – Sligo border, with some of the proposed renewable energy infrastructure located in each of the two counties. As the proposed development will occur within the functional area of two local authorities it is necessary to submit two separate planning applications, one to each of the relevant authorities for that portion of the development which occurs in their functional area.

Leitrim County Development Plan 2015-2021

The Leitrim County Development Plan 2015-2021 (LCDP) is the principal instrument that is used to manage change in land use in the County. The CDP sets out the Council's strategic land use objectives and policies for the overall development of the County up to 2021. The Plan seeks to develop and improve, in a sustainable manner, the social, economic, cultural and environmental assets of the County.

Under the County Development Plan the following strategic goals have been set under Section 2.2.1 'Resources' with regards to energy/renewable energy:

- *"To support energy generation from renewable resources where practicable and appropriate";*
- *"To ensure an adequate supply of energy, including renewable energy, is available to meet the social, commercial and economic needs of the entire County;"*

The LCDP states that

> *"The Council recognises the potential of the County for generating electricity by means of windfarms and is favourably disposed towards their development subject to the protection of the environment and visual amenity" (Page 198 LCDC refers)*

Under Section 3.4 of the LCDP it is detailed that Leitrim County Council will support development and expansion of the County's Green Infrastructure.

Section 4.11.5 of the CDP notes the council's vision for wind farms within the county over the lifetime of the plan. The Council acknowledges the role which wind energy has, mainly in reducing the reliance

on non-renewable sources of energy, reducing the dependency on imported fuels and in moving towards a 'low carbon' society.

- ***Policy 128:***

It is the policy of the Council that all wind farm applications will be assessed on the full range of criteria including those mentioned herein and those identified in the Wind Farm Development Guidelines, 2006 (or any subsequent update) published by the Department of Environment, Heritage and Local Government.

- ***Policy 135:***

It is the policy of the Council to support national policy on reducing carbon emissions and increasing energy generation from renewable sources.

Sligo County Development Plan 2017-2023

The Sligo County Development Plan 2017 – 2023 (SCDP) was adopted in July 2017 and came into operation in August 2017. Section 10.6 of the SCDP examines climate change within the county, it is noted that:

"It is widely accepted that climate change is a reality which is happening on an ongoing basis"

The SCDP acknowledges that energy efficiency and the use of renewable energy help to reduce GHG emissions and therefore play a key role in tackling climate change. The following policies are listed in relation to climate change:

- ***P-CAM-1***

"Support the implementation of the National Climate Change Adaptation Framework 2012, by including relevant measures in any forthcoming adaptation plans. Such plans shall be in accordance with national guidance issued by the DoECLG and EPA and undertaken in collaboration with the Northern and Western Regional Assembly, Mayo County Council, Roscommon County Council, Leitrim County Council and Donegal County Council."

- ***P-CAM-4***

"Raise public awareness and build local resilience in relation to climate adaptation."

- ***P-CAM-4***

"Facilitate and assist County Sligo's transition to a low-carbon economy and society."

- ***P-CAM-5***

Promote, support and implement measures that reduce man-made GHGs, including energy management, energy efficiency, compact development patterns, low-carbon buildings and sustainable transport

- ***P-CAM-8***

"Promote and support the use of renewable energy in all sectors."

- ***P-CAM-9***

"Support community participation in, and benefit from, renewable energy and energy efficiency projects."

Chapter 11 indicates the Council's views surrounding energy within the county over the lifetime of the plan. It is recognised that the availability of suitable and adequate energy is of critical importance to social and economic development. Furthermore, being rich in renewable energy resources, County Sligo is well-placed to lay solid foundations for a sustainable energy future. Sligo County Council will promote and support the development and diversification of the local energy sector in accordance with EU, national and regional policy. The plan acknowledges that Sligo's mountainous landscape and exposed location on the western seaboard combine to create good conditions for the generation of wind power. It is a challenge for the Council to achieve a reasonable balance between:

a) *responding to government policy on renewable energy; and*

b) *enabling the wind energy resources of the County to be harnessed in an environmentally sustainable manner.*

The policies of Sligo County Council in relation to wind energy include:

- ***Policy SP-EN-1**: "Support the sustainable development, upgrading and maintenance of energy generation, transmission, storage and distribution infrastructure, to ensure the security of energy supply and provide for future needs, as well as protection of the landscape, natural, archaeological and built heritage, and residential amenity and subject to compliance with the Habitats Directive."*
- ***Policy SP-EN-2**: "Facilitate the sustainable production of energy from renewable sources, energy conversion and capture in forms such as wind power, hydro-power, wave-generated energy, bioenergy, solar technology and the development of Waste to Energy/Combined Heat and Power schemes at appropriate locations and subject to compliance with the Habitats Directive. All such development proposals will be assessed for their potential impact on urban and rural communities, Natura 2000 sites, designated Sensitive Rural Landscapes, Visually Vulnerable Areas, Scenic Routes and scenic views, as well as in accordance with strict location, siting and design criteria."*
- ***Policy SP-EN-6**: "Support the implementation of relevant programmes arising from the Government's Energy White Paper 'Ireland's Transition to a Low Carbon Energy Future 2015-2030' (or any successor document)."*
- ***Policy SP-EN-7**: "Protect significant landscapes from the visual intrusion of large-scale energy infrastructure."*

It is an objective of Sligo County Council to:

- ***Objective SO-EN-2**: "Undertake an analysis of suitable areas for wind energy and prepare a map showing County Sligo's Landscape Suitability for Wind Energy Developments, in accordance with Section 3.5 of the Wind Energy Guidelines (2006) and any subsequent revisions."*

The Sligo Development Plan includes a range of policies in relation to natural heritage as follows:

- ***Policy P-DSNC-1 which is to:***

"Protect and maintain the favourable conservation status and conservation value of all natural heritage sites designated or proposed for designation in accordance with European and national legislation and agreements. These include Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Natural Heritage Areas (NHAs), Ramsar Sites, Statutory Nature Reserves. In addition, the Council will identify, maintain and develop non-designated areas of high nature conservation value which serve as linkages or 'stepping stones' between protected sites in accordance with Article 10 of the Habitats Directive."

- ***Policy P-DSNC-4:***

"Consider development within, or with the potential to affect, Natural Heritage Areas or proposed Natural Heritage Areas, where it is shown that such development, activities or works will not have significant negative impacts on such sites or features, or in circumstances where impacts can be appropriately mitigated"

- ***Policy P-DSNC-3 is also relevant, stating:***

"Carry out an appropriate level of assessment for all development plans, land-use plans and projects that the Council authorises or proposes to undertake or adopt, to determine the potential for these plans or projects to impact on designated sites, proposed designated sites or associated ecological corridors and linkages in accordance with the Habitats Directive, All appropriate assessments shall be in compliance with the provisions of Part XAB of the Planning and Development Act 2000."

Wind Energy Development Guidelines

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

The '*Wind Energy Development Guidelines for Planning Authorities*' (DoEHLG, 2006) are currently the subject of a targeted review. The proposed changes to the assessment of impacts associated with onshore wind energy developments are 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). A consultation process in relation to the 2019 document concluded on the 19th of February 2020.

At time of writing, the Draft Guidelines have not yet been adopted, and the relevant guidelines remain those published in 2006. Notwithstanding this, however, due to the timelines associated with the planning process for renewable energy projects, it is possible that a version of the draft guidelines may be finalised during the consideration period for the current proposed development. Towards this end it is anticipated that the Croagh Wind Farm will be capable of adhering to the relevant noise and shadow flicker standards.

Planning History

The relevant planning history of the proposed development site, the planning applications in the vicinity of the site along with other wind energy applications within the wider area are provided under Section 2.5 within this EIAR. .

Scoping and Consultation

A comprehensive scoping and consultation exercise was undertaken during the preparation of this EIAR. A scoping report, providing details of the application site and the proposed development, was prepared by MKO and circulated in December 2018. MKO requested the comments from relevant personnel/bodies in their respective capacities as consultees with regards to the EIAR process.

Pre-application consultations were also held with Leitrim County Council and Sligo County Council in which the proposed development was introduced, detailed discussions were held with regards to the proposed development.

Coillte has undertaken a comprehensive community engagement programme over the 2018/2019 period liaising with near neighbours and those in the wider area with regard to the proposed wind farm. Community engagement commenced in June 2018 with the appointment of a community liaison officer (CLO) for the proposed project. The full scope of the community consultation is provided under Section 2.7.1 and Appendix 2-2 of this EIAR.

Consideration of Reasonable Alternatives

This chapter of the EIAR includes 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 environmental effects. The consideration of alternatives typically refers to alternative design, technology, location, size and scale. A 'Do Nothing Scenario' i.e. an outline of what is likely to happen to the environment should the Project not be implemented, should also be included.

In 2014, Coillte's Renewable Energy Development Team undertook a detailed screening process, through Geographical Information Spatial software (GIS), using a number of criteria and stages to assess the potential of a large number of possible sites, on lands within its stewardship (c. 441,000 hectares), suitable to accommodate a wind energy development. The GIS database drew upon a wide array of key spatial datasets such as forestry data, ordnance survey land data, house location data, transport, existing wind energy and grid infrastructure data and environmental data such as ecological designations, landscape designations and wind energy strategy designations available at the time. The application of the above criteria to identify a site relevant to the project and its specific characteristics, resulted in the selection of a site known as Croagh, located on the northwestern slopes of Carran Hill as a candidate site to be brought forward for more detailed analysis. Four other sites, located in Clare, Donegal, Cork and Kilkenny, also emerged from the site selection process which Coillte intend to bring forward for wind energy development.

Although the 2014 screening exercise was based on identifying lands for wind development; a reasonable alternative source of renewable electricity generation namely solar was considered based on the scale and current land-use of the Croagh site that emerged. A wind energy development was considered to be the most efficient method of electricity production at this site. A solar array development would have a higher potential environmental effect on Hydrology and Hydrogeology, Traffic and Transport (construction phase) and Biodiversity and Birds (habitat loss, glint and glare) at the site.

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

The final proposed turbine 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 that have been carried out during the EIAR process and the community engagement process that began in June 2018. As information regarding the site of the proposed development was compiled and assessed, the proposed layout has been revised and amended to take account of the physical constraints of the site and the requirement for buffer zones and other areas in which no turbines could be located, as well as cumulative impacts.

It was decided at an early stage during the design of the proposed development that maximum possible use would be made of existing roadways and tracks where available to minimise the potential for impacts by using new roads. Constructing an entirely new road network, having no regard to existing roads or tracks. This approach was not favourable, as it would create the potential for additional significant environmental effects to occur in relation to land, soils and geology (increased excavation and aggregate requirements), hydrology (increased number of new watercourse crossings) and biodiversity (increased habitat loss).

The use of multiple temporary construction was deemed preferable to the alternative of a single large compound at the southern end of the site for a number of reasons. Principally, it will facilitate more efficient construction practices and will result in shorter distances for traffic movements within the site during construction. As a result, vehicle emissions and the potential for dust arising will be reduced.

Three alternative substation locations were considered at a very early stage of the design of the proposed development. The chosen location is shown in Figure 4-1 of the EIAR. While the alternative locations would have decreased the required length of the grid connection cabling to the nearest existing substations, the footprint of the proposed development would have increased as existing roads to any of these locations would have required widening and the alternative locations would have also required the construction of new roads, thereby resulting in greater habitat loss, increased traffic movements and an increased requirement for construction materials.

The proposed grid connection route was one of three grid connection routes considered at the outset of the design process of the proposed development. The proposed grid connection route to the existing Garvagh substation was chosen due to the fact that it did not require the construction of any additional new access road, it does not pass by any residential dwellings and it is located within lands under the control of the applicant for its entire length.

The proposed borrow pit location was selected due to the presence of competent or usable rock at an acceptable level below existing surface level. Developing borrow pits at the alternative locations that were subject to site investigations, would result in a significant increase in the volumes of peat and spoil to be excavated in order to access the usable rock underneath and therefore much higher volumes of excavated material that would need to be managed onsite. The excavation of such increased volumes of peat and spoil has the potential to lead to adverse environmental effects in relation to peat instability and dust emissions.

The alternatives considered for the port of entry of wind turbines into Ireland for the proposed development include Dublin Port and the Port of Galway. Dublin Port is the county's principal seaport catering for approximately two-thirds of Ireland's port traffic. The Port of Galway also offers a roll-on roll-off procedure to facilitate import of wind turbines. Both ports and indeed others in the State (including Cork and Shannon-Foynes), offer potential for the importing of turbine components and therefore are equally viable alternatives.

An assessment of three site access route options was carried out, taking account of criteria such as third-party land requirements, existing road upgrade and new road construction requirements and associated environmental effects. The proposed site access route between the R280 and the site was the chosen option given the availability of land under the control of the applicant and other participating third-party landowners between the village of Drumkeeran and the main site entrance in the townland of Boleymaguire.

Description of the Proposed Development

The overall layout of the proposed development is shown on Figure 4-1. This drawing shows the proposed locations of the wind turbines, electricity substation, construction compounds, internal roads layout and the site entrances. Detailed site layout drawings of the proposed development are included in Appendix 4-1 to this EIAR.

The 10 no. proposed wind turbines will have a tip height of up to 170 metres. Within this size envelope, various configurations of hub height, rotor diameter and blade tip height may be used. The exact make and model of the turbine will be dictated by a competitive tender process, but it will not exceed a tip height of up to 170 metres above top of foundation. Modern wind turbines from the main turbine manufacturers have evolved to share a common appearance and other major characteristics, with only minor cosmetic differences differentiating one from another. The wind turbines that will be installed on the site will be conventional three-blade turbines, that will be geared to ensure the rotors of all turbines rotate in the same direction at all times. It is proposed that the turbines would be of an off-white or light grey colour so as to blend into the sky background.

Each wind turbine is secured to a reinforced concrete foundation that is installed below the finished ground level on a granular sub-base after the excavation of soil and peat. The size of the foundation will be determined by the turbine manufacturer, and the final turbine selection will be the subject of a competitive tender process. The turbine foundation transmits any load on the wind turbine into the ground. Hard standing areas consisting of levelled and compacted hardcore are required around each turbine base to facilitate access, turbine assembly and turbine erection. The hard-standing areas are typically used to accommodate cranes used in the assembly and erection of the turbine, offloading and storage of turbine components, and generally provide a safe, level working area around each turbine position.

To provide access within the site of the proposed development and to connect the wind turbines and associated infrastructure, approximately 7.5 kilometres of new access roads will need to be constructed including the upgrade 11.1km of existing access road.

It is proposed to construct a 38kV electricity substation within the site of the Proposed Development as shown in Figure 4-1. The proposed substation site is located within an area of forestry adjacent to an existing access road in the northern part of the site.

One wind farm control building will be located within the substation compound. The wind farm control building will include staff welfare facilities for the staff that will work on the proposed development during the operational phase of the project. Toilet facilities will be installed with a low-flush cistern and low-flow wash basin. It is proposed to manage wastewater from the staff welfare facilities in the control buildings by means of a sealed storage tank, with all wastewater being tankered off site by an appropriately consented waste collector to wastewater treatment plants.

Each turbine will be connected to the on-site electricity substation via an underground 33 kV (kilovolt) electricity cable. Fibre-optic cables will also connect each wind turbine to the wind farm control building in the onsite substation compound. The electricity and fibre-optic cables running from the turbines to the onsite substation compound will be run in cable ducts laid in trenches approximately 1.3 metres below the ground surface, along the sides of or underneath the internal roadways. A connection between the proposed development and the national electricity grid will be necessary to export electricity from the proposed wind farm. This connection will originate at the proposed onsite substation and will be connected to the national grid via either an underground grid connection cable which will connect into the existing 110 kV Garvagh substation, located within the townland of Seltan. The grid connection cabling route is approximately 6.2 kilometres in length.

One permanent meteorological mast is proposed as part of the wind farm development. The meteorological mast will be equipped with wind monitoring equipment at various heights. The mast will be a slender free-standing structure up to 100 metres in height.

Two temporary construction compounds are proposed as part of the proposed development. The construction compounds will consist of temporary site offices, staff facilities and car-parking areas for staff and visitors.

It is estimated that approximately 406,830m^3 of peat and spoil will be excavated during the construction of the proposed development. This peat and spoil will be managed by means of placement within the proposed borrow pit or the proposed peat and spoil repository areas. Crushed stone is required for the construction of the proposed development it is proposed to source the majority of this stone from the on-site borrow pit. It is anticipated that a certain volume of finer, crushed stone, used to provide the final surface layer for site roads and hardstanding areas will be brought to the site from local, appropriately authorised quarries.

A total of approximately 55.1 hectares of forestry will be permanently felled within and around the footprint of the Proposed Development in order to facilitate infrastructure construction and turbine erection. The area of forestry that will be permanently felled for the footprint of the turbines and the other infrastructure and turbine erection will be replaced or replanted on a hectare for hectare basis as a condition of any felling licence that might be issued in respect of the proposed wind farm. This can occur anywhere in the state subject to licence. Three forestry replacement sites have been identified for the purposes of assessment in this EIAR. These sites are located in Cavan, Roscommon and Wicklow and have all been granted technical approval for afforestation by the Forest Service.

During the construction of the proposed development, the Croagh Wind Farm site will be accessed via a proposed new construction phase entrance and access road off the L4282 Local Road in the townland of Derrycullinan, Co. Leitrim. This entrance will be used as the primary site entrance during the construction phase of the proposed development. The boundary with the L4282 will be reinstated with

fencing upon the completion of the construction stage. The main site entrance that will be used to access the wind farm site, during both the construction and operational phases of the proposed development, is an existing entrance off the L4282 in the townland of Boleymaguire. This entrance will be used as the primary site entrance during the operational phase for the access and egress of operational and maintenance staff.

The site of the proposed development is currently accessed, from the R280 to the west, via the local road network. In order to facilitate the delivery of large turbine components and other abnormal loads to the site, this application includes for the construction of:

- a link road through a farmyard and agricultural land, between the R280 in the village of Drumkeeran and the L4282 in the townland of Derryboffin; and,
- a construction phase access road between the L4282 at Derrycullinan and the same local road at Bargowla.

It is proposed that large wind turbine components will be delivered to the site of the proposed development, from Dublin Port or Galway Port, via the M4 Motorway which becomes the N4 National Primary Route at Knocksimon, Co. Westmeath. The delivery vehicles will continue northwest on the N4 before turning will turning on to the R299 Regional Road at Drumsna, Co. Leitrim. From here the delivery vehicles will travel northwest before turning right on to the R280 Regional Road and continuing north before turning left onto the proposed link road in the village of Drumkeeran. The delivery vehicles will turn south onto the L4282 in the townland of Derrybofin and continue west along the L4282 to the proposed new construction site access road at Derrycullinan. The delivery vehicles will travel southeast along the proposed construction access road before switching back in a westerly direction and then turning south again onto the L4282 and continue south towards the main site entrance in the townland of Boleymaguire.

Coillte expects that for each megawatt hour (MWh) of electricity produced by the wind farm, the project will contribute €2 into a community fund for the RESS period i.e. first 15 years of operation and €1 per MWh for the remaining lifetime of the wind farm. If this commitment is improved upon in upcoming Government Policy it will be adjusted accordingly .If this project is constructed as currently designed we estimate that a total of approximately €5 million will be available in the local area for community funding over the lifetime of the project.

The Community Benefit Fund belongs to the local community. The premise of the fund is that it should be used to bring about significant, positive change in the local area. To make this happen, the first task will be to form a benefit fund development working group that clearly represents both the close neighbours to the project as well as nearby communities. This group will then work on designing the governance and structure of a community entity that would administer the Community Benefit Fund. Coillte aim to commence this work in autumn 2020.

In addition to the economic benefits of the proposed development, there will be potential social and recreational benefits associated with the recreational and amenity proposals that will form part of the project. The proposed development and all its associated infrastructure creates a unique opportunity to develop an amenity area for use by members of the local and wider community alike. The upland nature of the site is attractive to both locals and visitors to the area. It is proposed to develop some recreational walks as part of the Croagh Wind Farm project. These proposed walks will utilise existing forest tracks, new wind farm roads and proposes trails, a boardwalk area together with a viewing area adjacent to Lough Nacroagh. In addition, areas around the proposed amenities will be targeted for planting with broadleaves and berried trees to create areas of interest for small birds and increase the biodiversity habitat of the area. The proposed amenity facilities will allow for a safer and improved visitor experience and allow the site to be more openly available to walkers, trail runners, cyclists and other recreational users, as outlined in Section 4.6 of Chapter 4 of this EIAR.

The protection of the watercourses within and surrounding the site, and downstream catchments that they feed is of utmost importance in considering the most appropriate drainage proposals for the site of the proposed development. The proposed development drainage design has therefore been proposed specifically with the intention of having no negative impact on the water quality of the site and its associated rivers and lakes, and consequently no impact on downstream catchments and ecological ecosystems. No routes of any natural drainage features will be altered as part of the proposed development and turbine locations and associated new roadways have been selected to avoid natural watercourses, and existing roads are to be used wherever possible. There will be no direct discharges to any natural watercourses, with all drainage waters being dispersed as overland flows. All discharges from the proposed works areas will be made over vegetation filters at an appropriate distance from natural watercourses. Buffer zones around the existing natural drainage features have been used to inform the layout of the proposed development.

It is estimated that the construction phase will take approximately 12 to 18 months from starting onsite to the full commissioning of the wind farm. The construction phase can be broken down into three main phases, 1) civil engineering works: 18 months, 2) electrical works: 18 months, and 3) turbine erection and commissioning: 9 months.

During the operational phase, each turbine will be subject to a routine maintenance programme involving a number of checks and changing of consumables, including oil changes. In addition, there will be a requirement for unscheduled maintenance, which could vary between resetting alarms to major component changes requiring a crane. Typically, maintenance traffic will consist of four-wheel drive vehicles or vans. The electricity substation and site tracks will also require periodic maintenance.

The wind turbines proposed as part of the proposed development are expected to have a lifespan of approximately 30 years. Following the end of their useful life, the wind turbines may be replaced with a new set of turbines, subject to planning permission being obtained, or the proposed development may be decommissioned. The onsite substation will remain in place as it will be under the ownership of the ESB.

Population and Human Health

One of the principle concerns in the development process is that people, as individuals or communities, should experience no diminution in their quality of life from the direct or indirect impacts arising from the construction and operation of a development. The key issues examined in this chapter of the EIAR include population, human health, employment and economic activity, land-use, residential amenity, community facilities and services, tourism, property values, shadow flicker, noise and health and safety.

The proposed development site boundary is located adjacent to the village of Drumkeeran, Co. Leitrim at its closest point (the closest proposed turbine is located 4.8km from the village) and 7.3 km southeast of the town of Dromahair, Co. Leitrim, in which the main services and local amenities including a community centre, church and shop are located. There are no key identified tourist attractions pertaining specifically to the site of the proposed development itself although it is proposed to develop a recreational and amenity facility as part of the Proposed Development.

The Study Area for the Population and Human Health assessment was defined by the 3 No. District Electoral Division (DED)s within and adjacent to the development site. The population of the DEDs within the Study Area decreased by 3.8% between 2011 and 2016, falling from 704 to 677 persons, respectively, with the rate of population change unevenly distributed between the DEDs. The percentage labour force for the Study Area population was 55.3% which is lower than for the State as a whole (61.4%) and Counties Leitrim (59.5%) and Sligo (57.9%); however, the percentage of the Study Area labour force in employment is slightly higher than the State and Counties Leitrim and Sligo, at 87.9%. Similarly, the percentage of the Study Area labour force who are unemployed is lower that the State and Counties Leitrim and Sligo at 10.1%.

As stated above, approximately 80 – 100 jobs could be created during the construction, operation and maintenance phases of the proposed development with most construction workers and materials sourced locally, thereby helping to sustain employment in the construction trade. This will have a Short-Term Significant Positive Impact.

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

Shadow flicker is an effect that occurs when rotating wind turbine blades cast shadows over a window in a nearby property. Shadow flicker may be experienced by an occupant sitting in an enclosed room when sunlight reaching the window is momentarily interrupted by a shadow of a wind turbine's blade. Shadow flicker effect lasts only for a short period of time and happens only in certain specific combined circumstances. Current guidelines recommend that shadow flicker at neighbouring dwellings within 500 metres of a proposed turbine location should not exceed a total of 30 hours per year or 30 minutes per day. Just 5 No. dwellings are located within 1km of any proposed wind turbine location with only one of these dwellings being occupied and is 850m from the nearest proposed turbine.

The potential flicker that will occur at houses located within the area surrounding the proposed development was calculated using the WindFarm software package and a regional sun factor of 26.6% was applied. Of the 24 No. residential properties modelled, it is predicted that 13 No. properties may experience daily shadow flicker in excess of the 2006 DoEHLG guideline threshold of 30 minutes per day. However, this prediction does not consider wind direction or screening provided by intervening vegetation and topography.

Where shadow flicker exceedances are experienced,suitable mitigation measures as outlined in Chapter 5 will be employed at the potentially affected properties to ensure that the current adopted 2006 DoEHLG guidelines are complied with at any dwelling within the 1km study area. The same mitigation strategies also demonstrate that the proposed Croagh Wind Farm can be brought in line with the shadow flicker requirements of the Draft Revised Wind Energy Development Guidelines (2019) should they be adopted while this application is in the planning system.

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

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

Biodiversity

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

Multidisciplinary walkover surveys and detailed botanical surveys were undertaken on the 14th June 2017, 25th September 2017, 24th April 2019, 26th April 2019, 24th June 2019, 5th July 2019, 14th August 2019, 19th August 2019, 21st August 2019, 30th August 2019, 13th September 2019 and 31st January 2020. The survey timings were targeted to generally fall within the recognised optimum period for vegetation surveys/habitat mapping, i.e. April to September (Smith et al., 2011). A comprehensive walkover of the entire site was completed.

The habitats on the site of the proposed development were the subject of a detailed survey and assessment and a habitat mapping. This habitat mapping and assessment was undertaken following the 'A Guide to Habitats in Ireland' (Fossitt, 2000). Peatland and grassland habitats have also been categorised to plant communities from the National Survey of Upland Habitats (Perrin et al. 2014) and the Irish Vegetation Classification.

The majority of the study area (580 hectares/86.3% of the study area) is dominated by plantation forestry, comprising mainly of Sitka spruce (Picea sitchenis) and Lodgepole pine (Pinus contorta). Upland blanket bog (PB2) habitat occurs within the west of the site, as well as a small pocket in the centre of the site. This habitat is typically degraded where it occurs within the site boundary associated with historic and more recent turbary. Only Turbine 1, and part of the associated access road, is located within Upland blanket bog (PB2) habitat. This represents 0.55% of the habitat loss to the development footprint. This area is surrounded by bog that has been cutover in the past and shows evidence of drying-out. Poor fen and flush (PF2) habitat was recorded within the Upland blanket bog (PB2) within a low lying area and subsequent movement of ground and surface water through this area of peatland.

The construction of the proposed windfarm and associated infrastructure will result in the direct loss of approximately 0.91 hectares (1.47%) of the total study area, of Upland blanket bog (PB2) as a result of the proposed Turbine 1 and associated site access track. The remainder of the peatland habitats within the site have been entirely avoided in the design of the project with no potential for any effect thereon. There will be no significant habitat loss associated with the proposed development and a Biodiversity Management Plan has been prepared. The proposed development provides for the replacement of peatland habitat through the restoration of forestry (WD4) back to peatland, located adjacent to Turbine 7. It is also proposed to undertaken enhancement of this area of peatland, covering an area of 3.74 hectares, through drain blocking and the removal of encroaching conifers (establishing as a result of natural seed dispersal). Following the implementation of the Biodiversity Management Plan, the proposed development has the potential to result in a positive impact on biodiversity within the study area.

In general, given the highly modified nature of the site, dominated by commercial coniferous forestry (WD4), limited suitable habitat occurs on site for protected faunal species. A number of badger setts were recorded within the study area and were restricted to the haul road within plantation forestry. Evidence of fox, red deer, red squirrel, pine marten, Irish hare and otter were recorded within the site. In addition, detailed bat and fisheries assessments have been undertaken as part of the detailed baseline assessment. The detailed results of which are provided in technical appendices to this EIAR. No evidence of populations of these species being significant at more than a local level was recorded. No signs of any additional protected fauna were recorded within the study area during the field surveys.

No significant effects on surface water quality, groundwater quality or the hydrological/ hydrogeological regime were identified during either construction nor operation.

Provided that the proposed development is constructed and operated in accordance with the design, best practice and mitigation that is described within this application, significant impacts on ecology are not anticipated.

Ornithology

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

The potential for effects on designated sites is fully described in the Natura Impact Statement that accompanies this application. The findings presented in the NIS are that the proposed development, by itself or in combination with other plans and projects, in light of best scientific knowledge in the field, will not adversely affect the integrity of the relevant European sites and no reasonable scientific doubt remains as to the absence of such effects.

Based on the detailed assessment, it is considered that the potential effects of the proposed development upon birds will not be significant. Effects associated with habitat loss, disturbance displacement, collision risk and cumulative effects have been assessed to be no greater than Long-term slight negative effect (EPA, 2017) and low effect significance (Percival, 2003).

The implementation of the prescribed mitigation measures will render any potential effects on avian receptors to low significance. In conclusion, no significant effects as a result of the proposed development are foreseen on key ornithological receptors of the study area.

Land, Soils and Geology

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

The geology of the site predominately comprises blanket peat overlying glacial subsoil deposits which in turn are underlain by mainly shale and mudstone bedrock. Numerous trial pits and several boreholes were undertaken to investigate the geological conditions below the peat.

Peat depths recorded within the proposed infrastructure envelope ranged from 0 to 6.0m with an average of 2.1m. Peat depths recorded at the turbine locations varied from 0.3 to 4.5m with an average depth of 2.0m.

With respect to the existing and proposed access roads, peat depths are typically less than 3m with localised depths of up to 5m. Approximately 10km of existing access roads are present across the site and based on Coillte records have been in operation for a number of decades.

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

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

The extensive peat stability assessment undertaken at the site shows that the site has an acceptable margin of safety for the proposed development. A number of control measures are given, in Appendix 8-1 of this EIAR, in the peat stability assessment to ensure the correct management any potential risks associated with peat instability during the construction phase.

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

These methods will reduce the requirement for stock piling and prevent potential slope failure and erosion. Drainage and erosion prevention measures will be put in place at the peat storage areas. Overburden excavated along the grid connection route will be reinstated.

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

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

No significant impacts on land, soil and geological environmental are anticipated.

Hydrology and Hydrogeology

Hydro-Environmental Services (HES) was engaged by MKO to undertake an assessment of the potential direct, indirect and cumulative effects of the proposed Croagh Wind Farm development on water aspects (hydrology and hydrogeology) of the receiving environment.

With respect to regional hydrology, the Proposed Development is located in 2 no. river basins and 2 no. regional surface water catchments. The southern half of the wind farm site is located in the Shannon River surface water catchment within the Shannon International River Basin District (SHIRBD). The northern half of the wind farm site is located in the Garvogue River surface water catchments. The Garvogue River is located within the North Western International River Basin District (NWIRBD). With respect to turbine distribution, 4 no. are located in the Shannon River surface water catchment and 6 no. are located in the Garvogue River surface water catchment.

In terms of local hydrology, the southern half of the windfarm site is located in the Arigna River surface water catchment. The Arigna River flows into Lough Allen approximately 16km downstream of the site. The northern half of the windfarm site is located in the Bonet River surface water catchment. The Bonet River flows into Lough Gill approximately 15km downstream of the site. Approximately 6km of the construction access road drains directly to Lough Allen via the Owengar River.

Along with the local internal stream network, there are numerous manmade drains that are in place predominately to drain the forestry plantations. The integration of the proposed wind farm infrastructure with the existing forestry drainage in a manner that avoids water quality impacts in downstream water bodies is a key component of the wind farm design.

The bedrock underlying the site is classified as predominately poor in terms of well water yield potential. This was confirmed by drilling several investigation holes on-site. The bedrock has little or no open cracks which means groundwater movement within the aquifer is very localised. Groundwater at the site can be classed as sensitive in terms of potential impacts from the proposed development. However, the majority of the bedrock is covered in peat which acts as a protective cover to groundwater quality. The low potential for pollutant travel within the bedrock groundwater makes surface water bodies such as streams more sensitive to pollution than groundwater at this site. There will be no impact on private wells as a result of the development.

Designated sites that receive surface water runoff from the proposed wind farm development or grid connection route include Lough Gill SAC and Lough Forbes Complex SAC. These designated sites are considered very sensitive in terms of potential impacts. Comprehensive surface water mitigation and controls are proposed to ensure protection of all downstream receiving waters. Any introduced drainage works at the site will mimic the existing drainage regime thereby avoiding changes to flow volumes leaving the site.

Due to the nature of wind farm developments, being shallow construction activities, impacts on groundwater are generally negligible and surface water is generally the main sensitive receptor assessed during impact assessments. The primary risk to groundwater at the site would be from hydrocarbon spillage and leakages at the borrow pit or during refueling. These are common potential impacts to all construction sites (such as road works and industrial sites). These potential contamination sources will be carefully managed at the site during the construction and operational phases of the development and measures are proposed within the EIAR to deal with these potential minor local impacts.

Two methods will be employed to control drainage water within the site during construction, thereby protecting downstream surface water quality and aquatic habitats. The first method involves 'keeping clean water clean' by avoiding disturbance to natural drainage features, minimising any works in or around artificial drainage features, and diverting clean surface water flow around excavations and construction areas. The second method involves collecting any drainage waters from works areas within the site that might carry silt, to allow settlement and cleaning prior to its release. During the construction phase all runoff will be treated to a high quality prior to being released. There will be no risk of increased flooding down-gradient of the site as a result of the proposed development due to these drainage measures. Any potential impacts on water quality as a result of the wind farm will be imperceptible. A surface water monitoring programme will be put in place during the construction phase.

During the operational phase drainage control measures will ensure that surface runoff from the developed areas of the site will continue to be of good quality and will therefore not impact on the quality of down-stream rivers and streams. The present drainage regime of the site will not be altered in any way. No impacts on surface water quality are anticipated during the operational phase.

In terms of cumulative hydrological effects arising from all elements of the Proposed Development and work design, no significant effects are expected, and this is largely due to the proposed works being located in 2 no. separate regional surface water catchments.

Overall, the proposed development presents no significant impacts to surface water and groundwater quality provided the proposed mitigation measures are implemented.

No significant cumulative impacts on any of the regional surface water catchment or groundwater bodies will occur from the Proposed Development associated grid connection or forestry replacement sites.

Air and Climate

This chapter identifies, describes and assesses the potential significant direct and indirect effects on air quality and climate arising from the construction, operation and decommissioning of the proposed development.

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

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

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

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

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

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

Climate Change and Carbon Balance Calculations

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

In June 2019, the EPA published an update on Ireland's Greenhouse Gas Emission Projections to 2040. The report includes an assessment of Ireland's progress towards achieving its emission reduction targets out to 2020 and 2030 set under the EU Effort Sharing Decision (Decision No 406/2009/EU) and Effort Sharing Regulation (Regulation (EU) 2018/842).

Projected greenhouse gas emissions up to 2040 are obtained using two scenarios; 'With Existing Measures' and 'With Additional Measures'. The 'With Existing Measures' scenario assumes that no additional policies and measures, beyond those already in place by the end of 2017 are implemented. The 'With Additional Measures' scenario assumes the implementation of the "With Existing Measures" scenario and further implementation of the governments renewable and energy efficiency policies

including those set out in the National Renewable Energy Action Plan (NREA), the National Energy Efficiency Action Plan (NEEAP) and the National Development Plan 2018-2027.

The EPA Emission Projections Update notes that Ireland's non-Emissions Trading Scheme (ETS) emissions are projected to be 5% and 6% below 2005 levels in 2020 under the 'With Measures' and 'With Additional Measures' scenarios, respectively. The target for Ireland is a 20% reduction. Over the period 2013 – 2020, Ireland is projected to cumulatively exceed its compliance obligations by 10 Mt CO_2 (metric tonnes of Carbon Dioxide) equivalent under the 'With Measures' scenario and 9 Mt CO_2 equivalent under the 'With Additional Measures' scenario.

The report concludes:

- "Projections indicate that Ireland will exceed the carbon budget over the period 2021-2030 by 52-67Mt CO_2 equivalent with the gap potentially narrowing to 7-22 Mt CO_2 equivalent if both the ETS and LULUCF flexibilities described in the Regulation are fully utilised."
- "To determine compliance under the Effort Sharing Decision, any overachievement of the binding emission limit in a particular year (between 2013 and 2020) can be banked and used towards compliance in a future year. However, even using this mechanism Ireland will still be in non-compliance according to the latest projections."
- "Ireland still faces significant challenged in meeting EU 2030 targets in the non-ETS sector and national 2050 reduction targets in the electricity generation, built environment and transport sectors. Progress in achieving targets is dependent on the level of implementation of current and future plans."

The carbon balance of proposed wind farm developments in peatland habitats has attracted significant attention in recent years. When development such as wind farms are proposed for peatland areas, there will be direct impacts and loss of peat in the area of the development footprint. There may also be indirect impacts where it is necessary to install drainage in certain areas to facilitate construction. The works can either directly or indirectly allow the peat to dry out, which permits the full decomposition of the stored organic material with the associated release of the stored carbon as CO_2. It is essential therefore that any wind farm development in a peatland area saves more CO_2 than is released.

A methodology for calculation carbon losses was published in June 2008 by scientists at the University of Aberdeen and the Macauley Institute with support from the Rural and Environment Research and Analysis Directorate of the Scottish Government, Science Policy and Co-ordination Division. This methodology was refined and updated in 2011 based on feedback from users of the initial methodology and further research in the area. The web-based version of the carbon calculator, which supersedes the excel based versions of the tool, was released in 2016. The tool provides a transparent and easy to follow method for estimating the impacts of wind farms on the carbon dynamics of peatlands and was used to assess the effects of the proposed wind farm in terms of potential carbon losses and savings taking into account peat removal, drainage and operation of wind farm. The model calculates the total carbon emissions associated with the proposed wind farm development including manufacturing of the turbine technology, transport, construction of the development and carbon losses due to peatland disturbance. The model also calculates the carbon savings associated with the proposed wind farm development.

In total, it is estimated that **1,655,640** tonnes of carbon dioxide will be displaced over the proposed thirty-year lifetime of the wind farm

Construction of the proposed development will have a Short-Term, Imperceptible Negative Effect as a result of greenhouse gas emissions from construction plant and vehicles. Operation of the proposed development will have a Direct Long-Term Moderate Positive Impact on climate as a result of reduced greenhouse gas emissions.

Noise and Vibration

AWN Consulting Limited were commissioned to conduct an assessment into the likely environmental noise and vibration impacts of the proposed Croagh Wind Farm development.

The methodology adopted for assessing the noise impact of the wind energy development is based on the guidance in the document 'Wind Energy Development Guidelines for Planning Authorities' published by the Department of Environment, Community and Local Government, which are based on the UK document ETSU-R-97 The Assessment and Rating of Noise from Wind Farms which describes a detailed method for deriving maximum values of wind turbine noise, when measured at an external location in the vicinity of a house. Maximum values, or limits, are primarily based on the background noise levels and how it varies with wind speed, in the absence of wind farm.

The background noise environment has been established through noise monitoring surveys undertaken at several noise sensitive locations (NSLs) surrounding the proposed development. Typical background noise levels for day and night periods at various wind speeds have been measured in accordance with best practice guidance contained in the Institute of Acoustics document 'A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise' (IoA GPG). Prevailing noise levels are primarily attributable to wind noise in foliage, local road traffic noise and other agricultural and anthropogenic sources in the area.

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

The assessment of construction noise and vibration and has been conducted in accordance best practice guidance contained in BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise and BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Vibration. Subject to good working practice as recommended in the EIAR Chapter, noise associated with the construction phase is not expected to exceed the recommended limit values. The associated noise and vibration are not expected to cause any significant effects.

Based on detailed information on the site layout, turbine noise emission levels and turbine height, worst-case turbine noise levels have been predicted at all surrounding properties, termed NSLs in the guidance documents, for a range of operational wind speeds. The predicted noise levels associated with the proposed development will be within best practice noise limits recommended in Irish guidance, therefore it is not considered that a significant effect is associated with the development.

Noise from replacement substation has also been assessed and found to be within the adopted criteria.

No significant vibration effects are associated with the operation of the site.

In summary, the noise and vibration impact of the proposed development is not significant in the context of current national guidance.

Landscape and Visual

This chapter of the Environmental Impact Assessment Report (EIAR) addresses the potential landscape and visual impacts of the Croagh Wind Farm. The emphasis in this chapter is on the likely significant effects of the proposed development. It covers the assessment methodology, a description of the proposed development and the existing landscape based on relevant guidance. It includes a description of the landscape policy of Counties Leitrim and Sligo with specific reference to wind energy and the study area in which the proposed development site is located.

Due to the topography of the study area and in particular the upland areas around the site, the turbines will be screened by landform from areas within the 20 km visual study area as illustrated by Zone of Theoretical Visibility (ZTV) mapping. Additionally, wide-spread mature hedgerow and trees will provide additional screening. The forestry plantation trees while subject to cyclical felling are only felled in limited areas, leaving adjacent mature or semi-mature trees to provide continued screening.

The proposed wind energy development site is located in an area with a long history of wind energy development. Wind turbines have been a feature of this landscape for many decades. Therefore, while the proposed turbines add to the existing wind turbines, they do not introduce a new landscape element.

Landscape designations and policies were identified in Counties Leitrim, Sligo and Roscommon. There will be no landscape effects on designations in County Roscommon.

In County Leitrim the Areas of Outstanding Natural Beauty and High Visual Amenity Areas have theoretical visibility indicated in some areas, but distance and screening mean that the effects will be very minor.

The vast majority of scenic routes in Co. Sligo will not be affected by the proposed development. The two routes that will have some visibility of the proposed development, No's. 3 and 66, will experience an 'Imperceptible' and 'Slight' visual effect, respectively.

Using the Landscape Character Assessments of Counties Leitrim and Roscommon the Landscape Character Areas (LCAs) were identified within 15 km of the proposed turbines. In the absence of a County Sligo Landscape Character Assessment a provisional assessment was carried out as part of this EIAR and provisional LCAs were identified by a qualified landscape architect. Only Leitrim's LCA 11 Corry Mountain and the provisional LCA for Sligo LCA1 Carrane Hill, in which the proposed turbines are located, would experience direct effects on landscape character as a result of the proposed development. Any other effects on other LCAs would be moderate, indirect and a slight increase in visible turbines additional to the existing and permitted turbines, as the proposed development might be visible within the LCAs but located outside those other LCAs and thus be a landscape element seen in the distance.

Within the 20km study area existing and permitted wind turbines were identified and mapped in order to assess the cumulative landscape and visual effects.

Although, it was found that the proposed turbines would add to the cumulative landscape status, it would not change the character of the individual LCAs in terms of wind energy and therefore the cumulative landscape effects are considered Low.

Key visual receptors, such as scenic routes and views, settlements, recreational destinations and routes as well as major transport routes were identified within the study area, after which those where visibility could be excluded due to ZTV mapping or site surveys were screened out. The remaining visual receptors were selected as 15 viewpoints, along with 2 viewpoints within 2 kilometres, for which photomontages were prepared to assess the visual effects on the visual receptors. The visual assessment concluded that residual visual effects of "Moderate" was deemed to arise at one of the 17 viewpoint locations. All other viewpoints were assessed as resulting in Slight (3), Not Significant (9) or Imperceptible (4) residual visual effects. None of the visual receptors identified in County Roscommon will be affected.

Cumulative visual effects were assessed in terms of increase in spatial extent of turbines within the views of the selected viewpoints, visual separation of the proposed turbines from the permitted turbines and the perceived difference of scale between the existing/permitted turbines and the proposed turbines.

No cumulative effects will arise at two viewpoints. In the remaining 15 viewpoints it was found that the increase in spatial extent was predominantly 'Slight' to 'Moderate' While complete visual separation of the proposed turbines from the permitted turbines is achieved in one viewpoint, mostly 'Slight' to 'Moderate' separation was seen. The assessment of the perceived difference of scale was also predominantly 'Slight' to 'Moderate' with one viewpoint showing a 'Negligible' difference in scale. At no viewpoint was the difference in scale perceived as 'Substantial'.

Therefore, the cumulative visual effects are considered acceptable, in terms of increase in spatial extent, visual separation and difference in scale.

A comparative ZTV shows that the cumulative theoretical visibility of wind turbines in the study area over that of the existing and permitted turbines will increase by less than one percent due to the addition of the proposed Croagh turbines.

Archaeology and Cultural Heritage

This chapter comprises an assessment of the potential impact of the proposed development on the Cultural Heritage resource. Cultural heritage includes archaeology, architectural heritage and any other tangible assets. The assessment was based on GIS based mapping, ZTV and Viewshed analysis to assist with the assessment of impacts on setting followed by a desktop analysis of all baseline data and a comprehensive programme of field inspection of the EIAR site boundary.

No recorded monuments, National Monuments, RPS, NIAH or new archaeological sites are located within the EIAR boundary. No direct impacts to any of the aforementioned sites will occur therefore.

Indirect effects on the setting of National Monuments within 10km, RMPs within 5km and RPS/NIAH within 5km were included in order to assess impacts on setting in the wider landscape. Viewshed analysis, a review of the ZTV and site visits to National Monuments in State Care was undertaken to establish the nature and degree of impacts on the setting of such monuments. These potential impacts are considered to be 'not significant'. Impacts to setting of RMPs was undertaken and this included 95 monuments within 5km, the majority occurring between 4 and 5km of the nearest proposed turbine. Impacts to RMPs in the wider setting is considered to be 'slight'. Impacts to built heritage within 5km of the proposed turbines is also considered to be 'not significant' since none are located within the immediate vicinity.

The grid connection cable route was assessed and all cultural heritage assets within 100m of either side of the route was reviewed. An assessment of the route shows that no cultural heritage assets will be impacted by the proposed cable route. Whilst no direct impacts to the monuments will occur given the location of the cable route within the public road take, some mitigation measures are required during construction to alleviate/remove any negative effects to sub-surface features. An assessment of the construction access road was also undertaken which concluded that no known monuments are located along the route. A number of water crossings and townland boundaries (not subject to statutory protection) will be traversed by the proposed road and therefore some mitigation measures are necessary to alleviate the impacts.

An assessment of cumulative impacts was also undertaken taking into consideration projects within 20km of the proposed Croagh turbine development. Cumulative impacts on setting will increase slightly when considering RMPs (within 5km) to the north and north west of the site. No other cumulative impacts will occur.

Material Assets

Traffic and Transport

The traffic and transport assessment of the proposed development considers the effects that traffic generated by the proposed development, including the abnormal-size vehicles required to deliver the turbine plant equipment, would have on the surrounding highway network. It should be noted that abnormal weight loads are not a feature of the turbine delivery vehicles. They are abnormal in size only. All construction and delivery vehicles for the proposed development will be subject to the standard axle weight requirements set out under Road Traffic Regulations and therefore the loadings from construction traffic will not exceed the relevant standards.

The delivery route to the site for the abnormally sized loads required to transport the turbine components to the site (blades, towers and nacelles) turns left off the R280 in Drumkeeran onto a new proposed link road that passes through an existing farmyard to connect with the L-4282 at Derryboffin. The route then travels west on the L-4282 before turning left onto a proposed construction access road at Derrycullinan. The proposed construction access road comprises sections of upgraded forestry road and sections of new road and links back into the L-4282 by means of a new junction at Bargowla. From there the route follows the L-4282 south before heading northwest to the proposed site access. General construction traffic and site staff may approach Drumkeeran on the R280 from either the north or the south, and will continue onto the site via the L-4282 and the proposed construction access road.

The types of vehicles, delivering large turbine components, that will be required to negotiate the local network will be up to 76 metres long with a blade length of 70 metres. An assessment of the geometric requirements of the delivery vehicles was undertaken on the delivery routes. Locations where it was established that the existing road geometry will not accommodate all of the vehicles associated with the proposed development are highlighted, with the extent of remedial works indicated.

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

- During the 10 days when the concrete foundations are poured the effect on the surrounding road network will be negative, resulting in an increase in traffic levels ranging from 5% on the N4 to a 3 fold increase (203%) on the L-4282 leading to the site. It is noted that the high percentage increase forecast for the L-4282 is due to the low volume of background traffic. The direct effect will be temporary, and will be slight.
- During the remaining 245 days for the site preparation and ground works when deliveries to the site will take place, the effect on the surrounding road network will be negative, resulting in an increase in traffic levels ranging from 2% on the N4, to an increase of 59% on the L-4282 approaching the site. On these days, the direct effect will be temporary and will be slight.
- During the 10 days of the turbine construction stage when general materials are delivered to the site, the delivery of construction materials will result in a negative impact on the surrounding road network, increasing traffic levels, ranging from 1% on the N4, to an increase of 3 on the R280 and 3% on the L-4282 leading to the site. The direct effect during this period will be temporary and will be slight.
- During the 18 days when the various component parts of the wind turbine plant are delivered to the site using extended articulated HGVs, the effect of the additional traffic on these days will be moderate due to the size of vehicles involved, resulting in increased traffic volumes of between 2.0% on the N4 to 7% on the R280, and 65% on the L-4282 leading to the site, but will be temporary. The direct effect will be reduced to slight if the delivery of the large plant is done at night, as is proposed.

It was determined that all links in the study area and the junction between the R280 and the L-4282 will operate within operational capacity for all days within the construction period.

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

The successful completion of this project will require significant coordination and planning, and a comprehensive set of traffic management measures will be put in place before and during the construction stage of the project in order to minimise the effects of the additional temporary traffic generated by the proposed wind farm. The range of measures are set out in the Traffic Management Plan which will be implemented during construction and these measures include the appointment of a traffic management coordinator, agreement of a delivery programme with Leitrim County Council, use of temporary signage, management of site access and provision of information to local residents.

Telecommunications and Aviation

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

RTÉ Transmission Network (operating as 2rn), stated that that there is a risk of disruption to television reception for viewers to the south of the site. To mitigate against interference on viewers' television sets and/or broadcast radio receivers, RTÉ have recommended that a protocol agreement, between 2rn and the developer, be put in place for the wind farm development. The Protocol Document will ensure that the appropriate mitigation is carried out, by the wind farm developer, in the event of any unanticipated broadcast interference arising to RTÉ television or radio reception as a result of the proposed wind farm.

Of the scoping responses received from telephone, broadband and other telecommunications operators only Eir and Three had telecommunication links in the area and requested that buffers be added to these. The requested buffers have been incorporated into the final proposed turbine layout and therefore, the proposed development does not overlap with any of the telecoms links or clearance zones as requested by operators.

In February 2019, a scoping response was received from the Department of Defence (DoD) which set out lighting requirements for turbines, as follows:

- *Single turbines or turbines delineating corners of a wind farm should be illuminated by high intensity obstacle strobe lights (Red).*
- *Obstruction lighting elsewhere in a wind farm will be of a pattern that will allow the hazard be identified and avoided by aircraft in flight.*
- *Obstruction lights used should be incandescent or of a type visible to Night Vision Equipment. Obstruction lighting fitted to obstacles must emit light at the near Infra-Red (IR) range of the electromagnetic spectrum specifically at or near 850 nanometres (NM) of wavelength. Light intensity to be of similar value to that emitted in the visible spectrum of light.*

In January 2019, a scoping response was received from the Irish Aviation Authority (IAA). The requirements of the IAA include the following:

- *Agree an aeronautical obstacle warning light scheme for the wind farm development.*
- *Provide as-constructed coordinates in WGS84 format together with ground and tip height elevations at each wind turbine location.*

- *Notify the Authority of intention to commence crane operations with a minimum of 30 days prior notification of their erection.*

All of the above requests will be complied with should the proposed development receive a grant of planning permission.

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

Interactions of the Foregoing

Chapters 5 to 14 of this EIAR identify the potential significant environmental effects that may occur in terms of Population and Human Health, Biodiversity, Ornithology, Land, Soils and Geology , Hydrology and Hydrogeology, Air and Climate, Noise and Vibration, Landscape and Visual, Cultural Heritage and Material Assets, as a result of the proposed development. All of the potential significant effects of the proposed development and the measures proposed to mitigate them have been outlined in the main EIAR. However, for any development with the potential for significant environmental effects there is also the potential for interaction between these potential significant effects. The result of interactive effects may exacerbate the magnitude of the effects or ameliorate them or have a neutral effect.

A matrix is presented in Chapter 15 of the EIAR to identify interactions between the various aspects of the environment already discussed in the EIAR. The matrix highlights the occurrence of potential positive or negative impacts during both the construction and operational phases of the proposed development. Where any potential interactive impacts have been identified, appropriate mitigation is included in the relevant sections (Chapters 5–14) of the EIAR.

1. INTRODUCTION

1.1 Introduction

This Environmental Impact Assessment Report (EIAR) has been prepared by McCarthy Keville O'Sullivan Ltd. (MKO) on behalf of Coillte, who intend to apply to both Leitrim County Council and Sligo County Council (the local authorities) for planning permission to construct a wind energy development that straddles the border between Co Leitrim and Co Sligo, comprising up to 10 no. wind turbines and associated infrastructure, near Drumkeeran, Co. Leitrim. The proposed development is being brought forward in response to local, national, regional and European policy regarding Irelands transition to a low carbon economy and associated climate change policy objectives.

Of the proposed turbines, 8 No. turbines and associated infrastructure are located within the functional area of Leitrim County Council and 2 No. turbines and associated infrastructure are located in the functional area of Sligo County Council. A planning application will be submitted to each local authority with respect to the development and works required in each of the relevant functional areas. This EIAR accompanies the planning applications for the proposed development submitted to the local authorities. The planning applications are also accompanied by a Natura Impact Statement ('NIS').

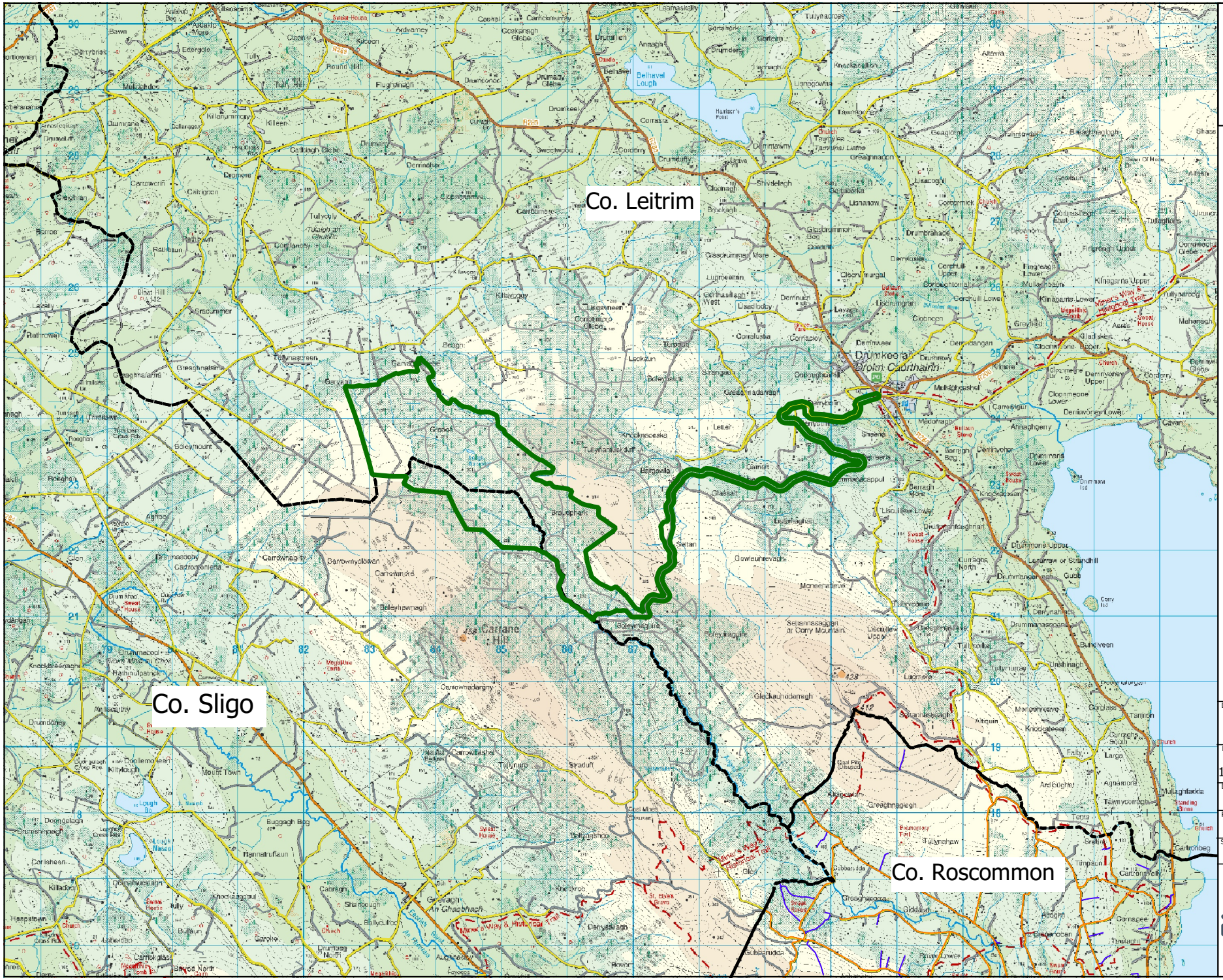
The core of the proposed development site is located within existing commercial forestry approximately 5.0 kilometres west of the village of Drumkeeran, Co. Leitrim and 7.0 kilometres southeast of the town of Dromahair, Co. Leitrim. Access to the site will be via an existing farmyardentrance off the R280 in the village of Drumkeeran and a combination, thereafter, of, the L4282 Local Road proposed new roads and existing roads to be upgraded.

It is proposed to connect the development to the national electricity grid via an underground cable which will connect the proposed onsite substation to the existing Garvagh substation, located adjacent to the proposed development site. The grid connection cabling route will measure approximately 6.2km in length. . This connection and all associated works form part of the planning applications. A full description of the development is contained in Chapter 4 of this EIAR.

The townlandswithin which the proposed site and ancillary works are located as well as the proposed grid connection route and proposed site access route, are listed in Table 1-1 Townlands within which the Proposed Development is located.. The location of the site is shown on Figure 1-1.

Table 1-1 Townlands within which the Proposed Development is located.

Townland	
Co. Leitrim	**Co. Sligo**
Bargowla	Carrowmore
Boleymaguire	Carrownyclowan
Braudphark	
Derreens	
Derryboffin	
Derrycullinan	
Derrycullinan Beg	



Map Legend

- EIAR Site Boundary
- County Boundary

Drawing Title

Site Location Context

Project Title	180511 - Croagh Wind Farm EIAR
Drawn By: Daire O'Shaughnessy	Checked By: Eoin McCarthy
Project No.: 180511	Drawing No.: Fig 1.1
Scale: 1:75,000	Date: 12.06.2020

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Townland	
Drummanacappul	
Garvagh	
Garvagh Glebe	
Glassalt	
Lisfuiltaghan	
Seltan	
Sheena	
Tinnybeg	

1.2 Legislative Context of 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 (the 'EIA Directive'), has been transposed into Irish planning legislation by the Planning and Development Act 2000 as amended and the Planning and Development Regulations 2001 as amended. Directive 2011/92/EU was amended by Directive 2014/52/EU which has been transposed into Irish law with the recent European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018). Most of the provisions of the new regulations came into operation on the 1st of September 2018 with a number of other provisions coming into operation on the 1st of January 2019.

This EIAR complies with the EIA Directive 2011/92/EU as amended by Directive 2014/52/EU.The Environmental Impact Assessment (EIA) of the proposed project will be undertaken by Leitrim County Council and Sligo County Council, as the competent authorities.

Article 5 of the EIA Directive 2011/92/EU as amended by Directive 2014/52/EU provides where an EIA is required, the developer shall prepare and submit an environmental impact assessment report (EIAR). 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, Schedule 6 to the Planning and Development Regulations 2001 to 2020 sets out the information to be contained in an EIAR, with which this EIAR complies.

MKO was appointed as environmental consultant on the proposed project and commissioned to prepare this EIAR in accordance with the requirements of the EIA Directive 2011/92/EU as amended by Directive 2014/52/EU.

The relevant classes/scales of development that require Environmental Impact Assessment (EIA) are set out in Schedule 5 of the Planning and Development Regulations 2001 to 2020. 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 paragraph 3(i) of Part 2 of Schedule 5. The proposed development exceeds 5 turbines and 5 Megawatts in scale, and therefore is required to be subject to EIA.

The EIAR provides information on the receiving environment and assesses the likely significant effects of the proposed project 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 authorities to conduct the Environmental Impact Assessment (EIA) of the proposed project.

All elements of the project, (including the wind turbines and associated infrastructure, substation, grid connection, replanting and turbine delivery route) have been assessed as part of this EIAR.

1.2.1 EIAR Guidance

The Environmental Protection Agency (EPA) published its *'Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports'* (EPA, August 2017), 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 with regard to these guidelines also.

1.2.2 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 also been taken into account during the preparation of this EIAR.

The '*Wind Energy Development Guidelines for Planning Authorities*' (DoEHLG, 2006) are currently the subject of a targeted review. The proposed changes to the assessment of impacts associated with onshore wind energy developments are 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). A consultation process in relation to the 2019 document concluded on the 19th of February 2020.

At time of writing, the Draft Guidelines have not yet been adopted, and the relevant guidelines remain those published in 2006. Notwithstanding this, however, due to the timelines associated with the planning process for renewable energy projects, it is possible that a version of the draft guidelines may be finalised during the consideration period for the current proposed development. Towards this end it is anticipated that the Croagh Wind Farm will be capable of adhering to the relevant noise and shadow flicker standards.

1.3 The Applicant

Coillte have been involved in the development of 4 operating wind farms including Raheenleagh (Wicklow), Sliabh Bawn (Roscommon), Cloosh (Galway) and Castlepook (Cork) which have a combined total capacity of over 300 megawatts (MW). This project is part of a wider Coillte ambition to support the delivery of a further 1 GW of renewable energy and therefore make a significant contribution to the ambitions outlined in the All of Government Climate Action Plan 2019.

1.4 Brief Description of the Proposed Development

The proposed development comprises the construction of 10 No. wind turbines and all associated works. The proposed turbines will have a blade tip height of up to 170 metres above the top of the foundation. The applicant is seeking a ten-year planning permission. The full description of the proposed development, as per the public planning notices, is as follows:

Overall Development Description

i. *Construction of 10 No. wind turbines with a maximum overall blade tip height of up to 170 metres, and associated hardstand areas;*
ii. *1 no. 38kV permanent electrical substation including a control building with welfare facilities, all associated electrical plant and equipment, security fencing, all associated underground cabling, waste water holding tank and all ancillary works;*
iii. *1 no. permanent Meteorological Mast with a maximum height of up to 100 metres;*
iv. *All associated underground electrical and communications cabling connecting the turbines to the proposed wind farm substation;*
v. *All works associated with the connection of the proposed wind farm to the national electricity grid, via underground cabling to the existing Garvagh substation;*
vi. *Upgrade of existing tracks and roads, provision of new site access roads and hardstand areas;*
vii. *The partial demolition and alteration of two agricultural buildings in the townlands of Sheena and associated junction access and road works to the existing yard, agricultural buildings and agricultural lands in the townlands of Sheena and Derrybofin to provide a link road primarily for construction traffic off the R280. This link road will be used for the delivery of abnormal loads to the site during the construction period and may be used during the operational period if necessary or to facilitate the decommissioning of the wind farm. Following construction, access to the link road will be closed off and the yard/agricultural building will revert to its use for agricultural purposes except if and when required for delivery of abnormal loads during the operational period of the windfarm or to facilitate the decommissioning of the wind farm;*
viii. *1 no. borrow pit;*
ix. *2 no. peat and spoil repository areas*
x. *2 no. temporary construction compounds;*
xi. *Recreation and amenity works, including marked trails, boardwalk and viewing area provision of a permanent amenity car park, and associated recreation and amenity signage*
xii. *Site Drainage;*
xiii. *Permanent Signage;*
xiv. *Ancillary Forestry Felling to facilitate construction and operation of the proposed development; and*
xv. *All associated site development works*

Leitrim County Council – Planning Notice Project Description

i. *Construction of 8 No. wind turbines with a maximum overall blade tip height of up to 170 metres, and associated hardstand areas;*
ii. *1 no. 38kV permanent electrical substation including a control building with welfare facilities, all associated electrical plant and equipment, security fencing, all associated underground cabling, waste water holding tank and all ancillary works;*
iii. *All associated underground electrical and communications cabling connecting the turbines to the proposed wind farm substation;*
iv. *All works associated with the connection of the proposed wind farm to the national electricity grid, via underground cabling to the existing Garvagh substation;*
v. *Upgrade of existing tracks and roads, provision of new site access roads and hardstand areas;*
vi. *The partial demolition and alteration of two agricultural buildings in the townlands of Sheena and associated junction access and road works to the existing yard, agricultural buildings and agricultural lands in the townlands of Sheena and Derrybofin to provide a link road primarily for construction traffic off the R280. This link road will be used for the delivery of abnormal loads to the site during the construction period and may be used during the operational period if necessary or to facilitate the decommissioning of the wind farm. Following construction, access to the link road will be closed off and the yard/agricultural building will revert to its use for agricultural purposes except if and when required for delivery of abnormal loads during the operational period of the windfarm or to facilitate the decommissioning of the wind farm;*
vii. *1 no. borrow pit;*
viii. *2 no. peat and spoil repository areas*
ix. *2 no. temporary construction compounds;*
x. *Recreation and amenity works, including marked trails, boardwalk and viewing area provision of a permanent amenity car park, and associated recreation and amenity signage*
xi. *Site Drainage;*
xii. *Permanent Signage;*
xiii. *Ancillary Forestry Felling to facilitate construction and operation of the proposed development; and*
xiv. *All associated site development works*

Sligo County Council – Planning Notice Project Description

i. *Construction of 2 No. wind turbines with a maximum overall blade tip height of up to 170 metres and associated hardstand areas;*
ii. *1 no. permanent Meteorological Mast with a maximum height of up to 100 metres;*
iii. *All associated underground electrical and communications cabling connecting the turbines to the proposed wind farm 38kV electricity substation (which is proposed to be located in the townland of Garvagh Glebe, Co. Leitrim);*
iv. *Upgrade of existing tracks, roads and provision of new site access roads;*
v. *Recreation and amenity works, including marked trails and associated recreation and amenity signage*
vi. *Site Drainage;*
vii. *Permanent Signage;*
viii. *Ancillary Forestry Felling to facilitate construction and operation of the proposed development; and*
ix. *All associated site development works*

This application is seeking a ten-year permission and 30 year operational life from the date of commissioning of the renewable energy 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 30 year operational life that is being sought as part of this application.

Modern wind turbine generators typically have an output of between 3.0 and 5MW. For the purposes of this EIAR it is assumed that the wind turbine model installed as part of the proposed renewable energy development will have a rated output of 4.8MW. Therefore, based on 10 no. wind turbines, the proposed wind turbines will have a combined output of 48MW.

The layout of the proposed development has been led by consideration of constraints and facilitators, thereby avoiding the environmentally sensitive parts of the site. The roads layout for the proposed development maximises the use of the existing onsite access roads and tracks where possible, with approximately 11.1 kilometres of existing roadway/ tracks requiring upgrading and approximately 7.5 kilometres of new access road to be constructed.

The EIAR Site Boundary for the proposed development encompasses an area of approximately 670 hectares, the majority of which comprises commercial forestry plantation. Where the 'site' is referred to in this EIAR, this means the primary study area for the EIAR. Generally, the study area extends beyond the planning application site boundary depending on the requirements of individual assessments. Where this occurs, the extent of the study area will be outlined in the relevant chapter, as required. The proposed permanent footprint of the proposed development measures approximately 36 hectares, which represents approximately 5.3% of the primary study area.

The EIAR Site Boundary is illustrated on Figure 1-2. An aerial view of the EIAR Site Boundary is shown in Figure 1-3. The Planning Application Site Boundary is shown in Appendix 4-1 of this EIAR.

The proposed grid connection forms part of the planning application and is assessed as part of the EIAR. It is proposed to construct a 38 kV substation within the site and to connect from here to the existing Garvagh substation, located adjacent to the site. Connection will be via underground cabling located within existing forestry and local county roads. The cabling route measures approximately 6.2 km in total.

The majority of the EIAR Site Boundary is currently used for commercial forestry, a small proportion of which will be felled to accommodate the wind farm development. A total area of approximately 55.1 hectares of commercial forestry will require replacement elsewhere in the State and this forms part of the project for assessment purposes. Details regarding the area to be felled are outlined in Chapter 4 of this EIAR.

The Forest Service policy on the granting of felling licences requires replanting of forestry on a hectare-by-hectare basis. Three potential forestry replacement areas have been identified for assessment purposes, with an availability of 59.33 hectares, located in Stranamart, Co. Cavan, Brackloon, Co. Roscommon and Ballard, Co. Wicklow. These lands has been granted Forest Service Technical Approval[1] for afforestation, and these or similarly approved lands will be used for replanting should the proposed development receive planning permission.

A significant minimum separation distance from houses of 850m from proposed wind turbines has been achieved with the project design. There are 5 no. dwellings located within 1 kilometre of any proposed wind turbine location with one of these dwellings being occupied. This occupied dwelling is located approximately 850 metres north of the closest proposed turbine location.

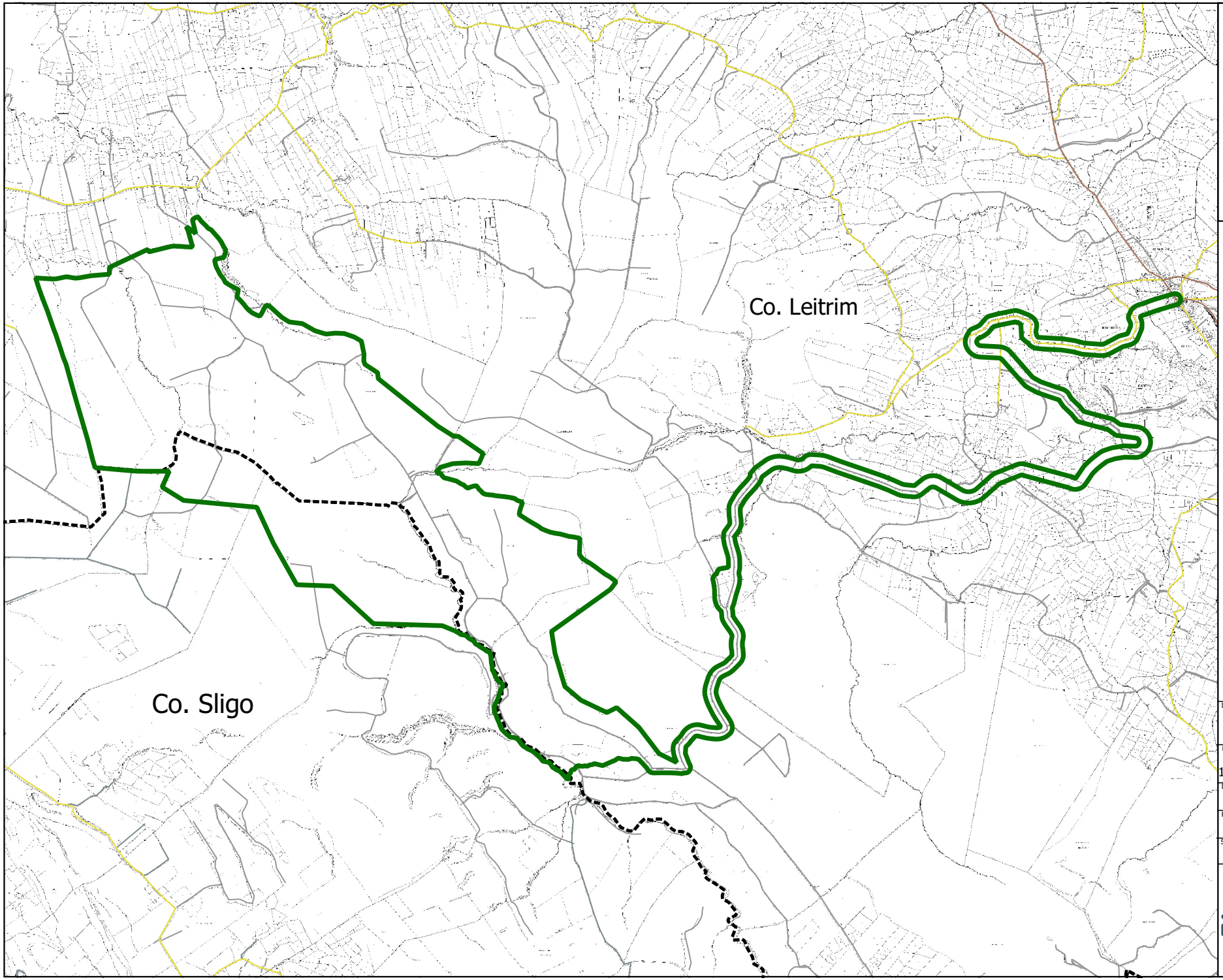
The proposed development is described in detail in Chapter 4 of this EIAR.

1.5 Need for the Proposed Development

1.5.1 Overview

It is now clear that Ireland will not meet its 2020 target for renewable energy with the Sustainable Energy Authority of Ireland (SEAI) reporting in May 2019 that 13 per cent of Ireland's energy will come from renewable sources by 2020, three per cent short of our European target of 16 per cent (SEAI, May 2019). Ireland faces significant challenges to its efforts to meet EU targets for renewable

[1] *All proposed forestry developments where the area involved is greater than 0.1 hectare must receive the prior written approval of the Forest Service. The application for approval is known as Pre-Planting Approval – Form 1.*



Map Legend

- EIAR Site Boundary
- County Boundary
- Regional Roads
- Local Roads
- Local Access Roads/ Existing Forestry Tracks

N

Drawing Title

Site Boundary

Project Title

180511 - Croagh Wind Farm EIAR

Drawn By	Checked By
Daire O'Shaughnessy	Eoin McCarthy
Project No.	**Drawing No.**
180511	Fig 1.2
Scale	**Date**
1:75,000	12.06.2020

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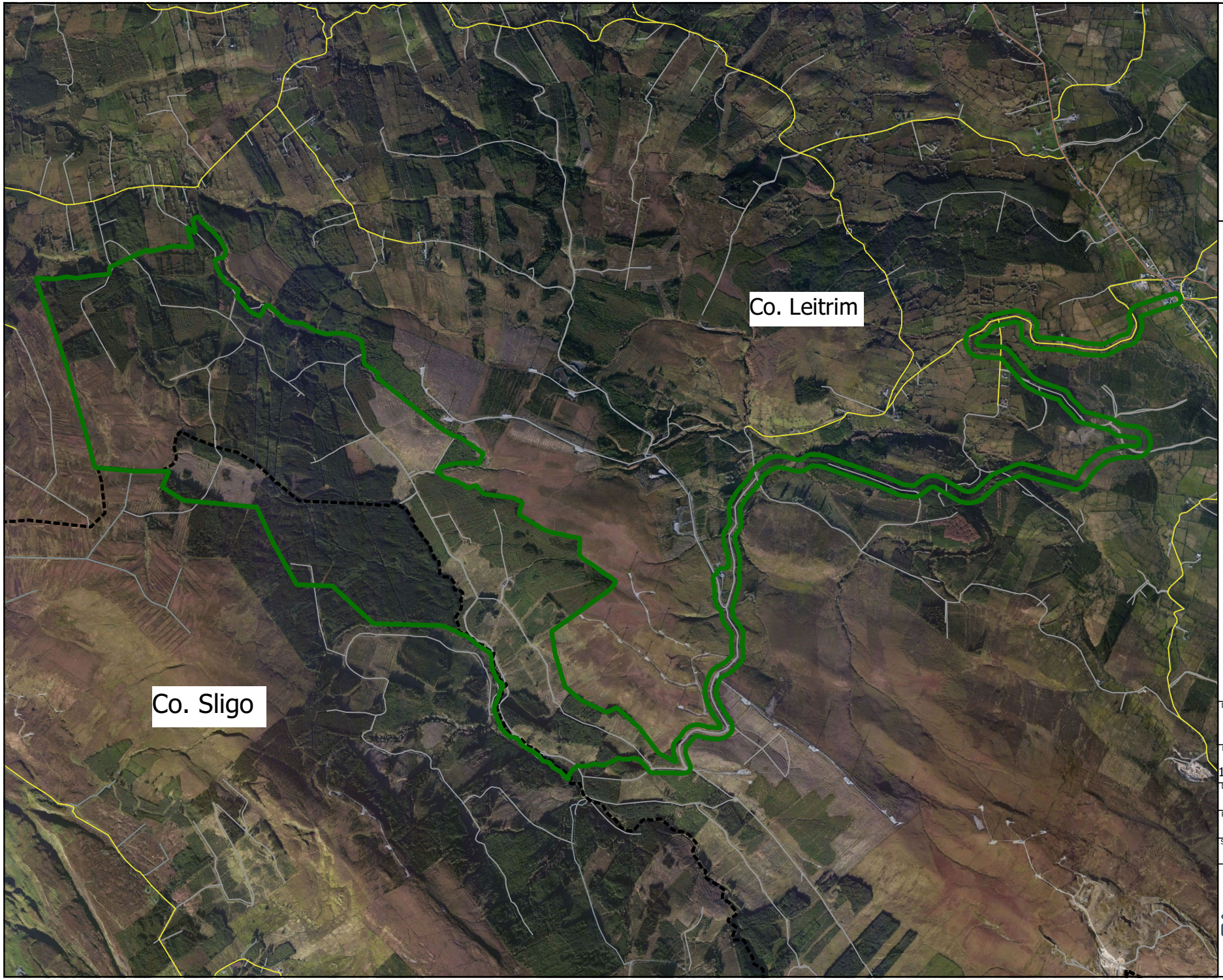

Map Legend

- EIAR Site Boundary
- County Boundary
- Regional Roads
- Local Roads
- Local Access Roads/ Existing Forestry Tracks

N

Drawing Title

Site Boundary

Project Title	180511 - Croagh Wind Farm EIAR
Drawn By: Daire O'Shaughnessy	Checked By: Eoin McCarthy
Project No.: 180511	Drawing No.: Fig 1.3
Scale: 1:35,000	Date: 12.06.2020

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energy by 2030 and its commitment to transition to a low carbon economy by 2050. Further detail can be found in Section 2.3.3 of this EIAR.

In March 2019, the Government announced a renewable electricity target of 70% by 2030. The proposed development is likely to be operational before 2030 and would therefore contribute to this 2030 target. More recently, the EPA reported that Ireland is set to fall far short of all of its carbon emissions reduction targets for 2030, despite climate action measures in the National Development Plan (EPA, June 2019). As such, the proposed Croagh wind energy 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 project 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 (Section 1.5.1.1);*
2. *A requirement to increase Ireland's national energy security as set out in the Energy White Paper (Section 1.5.1.2);*
3. *A requirement to diversify Irelands energy sources, with a view to achievement of national renewable energy targets and an avoidance of significant fines from the EU (the EU Renewables Directive) (Section 1.5.1.3 to Section 1.5.1.5);*
4. *Increasing energy price stability in Ireland through reducing an over reliance on imported fossil fuels; and*
5. *Provision of cost-effective power production for Ireland which would deliver local benefits (Section 1.5.1.6).*

The Climate Action Plan 2019 (CAP) was published on the 1st of August 2019 by the Department of Communications, Climate Action and Environment (DoCCAE). The CAP sets out an ambitious course of action over the coming years to address the impacts which climate may have on Ireland's environment, society, economic and natural resources. This Plan clearly recognises that Ireland must significantly step up its commitments to tackle climate disruption. The CAP identifies a need for 8.2GW of onshore wind generation. Only 3.7GW is in place as of December 2019, therefore Ireland needs to more than double its installed capacity of wind generation. The CAP presents clear and unequivocal support for the provision of additional renewable energy generation and presents further policy support for increased wind energy. Further information relating to the Climate Action Plan can be found in Chapter 2, Section 2.4.5.

Section 2.4 in Chapter 2 of this EIAR on Background to the Proposed Development, presents a full description of the international, national and regional renewable energy policy context for the proposed project. Section 2.4 addresses climate change, including Ireland's current status with regard to meeting greenhouse gas emission reduction targets.

1.5.1.1 Climate Change and Greenhouse Gas Emissions

At the Paris climate conference (COP21) in December 2015, 195 countries adopted the first-ever universal, legally binding global climate deal the Paris Agreement. The Paris 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 Paris Agreement, the EU and 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 International Panel on Climate Change (IPCC) has put forward its clear assessment 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 to below 2 degrees[2] and in accordance with the COP 21 agreement to limit global warming to well below 2°C above pre-industrial levels.

In this regard, the Government enacted the Climate Action and Low Carbon Development Act 2015, which provides for the approval of plans by the Government in relation to climate change for the purpose of pursuing the transition to a low carbon, climate resilient and environmentally sustainable economy.

The Energy White Paper, published by the Government in 2015, notes that "The use of renewables in electricity generation in 2014 reduced CO_2 emissions by 2.6 Mt and avoided €255 million in fossil fuel imports".

It is estimated that the proposed renewable energy development with a potential output of approximately 48MW from the proposed wind turbines will result in the net displacement of between approximately 55,188 tonnes of Carbon Dioxide (CO_2) per annum. The carbon offsets resulting from the proposed development are described in detail in Section 10.2.3 of Chapter 10: Air and Climate.

1.5.1.2 Energy Security

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. In 2015, the cost of all energy imports to Ireland was approximately €4.6 billion, with Ireland being one of the most energy import-dependent countries in the European Union, importing 88% of its fuel that year, up from 85% in 2014. This fell to €3.4 billion in 2016 (due mainly to reduced gas imports), rose to approximately €4 billion in 2017 and to approximately €5 billion in 2018. Ireland's import dependency in 2018 was 67%, down 21% from 2015, however, Ireland is still one of the more import dependent countries in the EU, with the EU average being just over 50% ('Energy in Ireland 2019', SEAI, 2019).

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 our 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".

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 still generates almost 25% of Ireland's electricity, but the National Climate Policy[3] calls for an aggregate reduction in carbon dioxide emissions of at least 80% (compared to 1990 levels) by 2050. Any steps to reduce this 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 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:

2 IPCC Fifth Assessment Synthesis Report, Intergovernmental Panel on Climate Change AR5 Report

3 Department of Communications, Climate Action and Environment, National Climate Policy, available at: https://www.dccae.gov.ie/en-ie/climate-action/topics/climate-action-at-a-national-level/Pages/default.aspx

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

1.5.1.2.1 Supports for 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 is capable of an average capacity factor of 31.7%[4], 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. EirGrid's website has more detailed information. A Poyry 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.

1.5.1.3 EU 2020 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 Directive (2009/28/EC) on the Promotion of the Use of Energy from Renewable Sources in April 2009, which includes a common EU framework for the promotion of energy from renewable sources.

The Directive sets a 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).

Ireland's mandatory national target is to supply 16% of its overall energy needs from renewable sources by 2020. This target covers energy in the form of electricity (RES-E), heat (RES-H) and transport fuels (RES-T). The contribution of renewables to gross final consumption (GFC) was 11% in 2018, compared to the 2020 target of 16% ('Energy in Ireland – 2019 Report, SEAI, December 2019). Furthermore, the Department of Communications, Climate Action & Environment (DoCCAE) reported most recently in their 'Fourth Progress Report on the National Renewable Energy Action Plan' (December 2017) that Ireland will achieve 13% of its 16% RES target by 2020.

For RES-E alone, Ireland has set a national target of 40% by 2020 as outlined in NREAP. Government policies identify the development of renewable energy, including wind energy, as a primary strategy in implementing national energy policy.

Noted above and further emphasised in the most recent SEAI report, 'Energy in Ireland – 2019 Report' (SEAI, December 2019); the share of renewable electricity (RES-E) was recorded at 33.2% in 2018, out

[4] *Energy in Ireland 2019 Report (Table 17) (SEAI, December 2019). Report available at: https://www.seai.ie/publications/Energy-in-Ireland-2019-.pdf*

of their 40% target; further reporting that Ireland is not on track to meet its 2020 renewable energy target.

In April 2020, the SEAI released an update to its 2019 'Renewable Energy in Ireland' report. The update report confirms that Ireland is not on track to meet any of its 2020 renewable energy targets and ranks second last of the 28 European countries (including the UK) in terms of progress towards 2020 targets. Renewable sources made up just 11% of Ireland's energy consumption in 2018, which is significantly short the 16% goal for 2020. The report notes that Ireland's dependence on fossil fuels for heating requirements (over 93%) was the primary cause for failing to achieve its overall renewable energy target.

Furthermore, analysis from EirGrid, has shown that 32% of electricity demand in Ireland during 2018 was met by renewable sources[5]. This shows a positive increase in renewable energy in Ireland from that previously recorded in 2017, but still highlights a shortfall relative to the 2020 target and the significant progress required to meet our targets and beyond 2020.

1.5.1.4 EU 2030 Renewable Energy Targets

In March 2019, the Minister for Communications, Climate Action & Environment, Richard Bruton, announced a renewable electricity target of 70% by 2030 for Ireland. The Joint Committee on Climate Change Action recommended in their recent report, 'Climate Change: A Cross- Party Consensus for Action' (March 2019), that new climate change legislation be enacted by the Oireachtas in 2019 to include:

- A target of net zero economy-wide GHG emissions by 2050;
- A provision for a 2030 target, consistent with the GHG emissions reduction pathway to 2050 to be set by 2020 by Statutory Instrument requiring the formal approval of both Houses of the Oireachtas following receipt of advice from the Climate Action Council;
- Provision for five-yearly carbon budgets, consistent with the emissions reduction pathway to 2030 and 2050 targets, to be set by Statutory Instrument requiring the formal approval of both Houses of the Oireachtas following receipt of advice from the Climate Action Council; and
- A target for the renewable share of electricity generation of 70% by 2030.

As noted previously, Ireland will not meet its 2020 renewable energy targets. 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 target. Further detail on the EU 2030 targets including the implications of the Climate Action Plan 2019 is noted in Chapter 2, Section 2.4.

1.5.1.5 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. The Energy White Paper in 2015 outlines an ambitious Greenhouse gas reduction target of between 80% to 95%, compared to 1990 levels, by 2050. Furthermore, if national carbon emissions targets are divided out amongst each county, each Local Authority may be responsible for meeting its own targets.

5 http://www.eirgridgroup.com/newsroom/renewables-demand-record/index.xml

Recent EU and World Health Organisation reports estimate that poor air quality accounted for premature deaths of almost 600,000 people in Europe in 2012[6]. In Ireland, the premature deaths attributable to air pollution are estimated at 1,200 people as outlined in 'Ireland's Environment – An Assessment' (EPA, 2016.) The report states that the pollutants of most concern are NO_x, (the collective term for the gases nitric oxide and nitrogen dioxide, PM (particulate matter) and O_3 (ozone). The EPA 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.

1.5.1.6 Economic Benefits

In addition to helping Ireland avoid significant fines and reducing environmentally damaging emissions, the proposed project 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 above, in 2018 the cost of all energy imports to Ireland was approximately €5 billion with imported fossil fuels accounting for 67% of all energy consumed ('Energy in Ireland 2019', SEAI, 2019).

The SEAI report 'Energy in Ireland 2019' indicated that renewable electricity (mostly wind energy) during 2018 and compared to 2016:

- Displaced €430 million in fossil fuel imports;
- Reduced CO_2 emissions by 4 million tonnes; and
- Did not add to consumer bills.

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.

The proposed development will be capable of providing power to supply approximately 35,040 households every year, as presented in the calculations in Section 4.3.1.6 of of this EIAR.

At a Regional Level, the proposed development will help to supply the rising demand for electricity, resulting from renewed economic growth. The 'All-island Generation Capacity Statement 2017 – 2026' (SONI and Eirgrid, 2017) notes that electricity demand on the island of Ireland is expected to grow by 17% over the next ten years.

6 www.euro.who.int/en/health-topics/environment-and-health/air-quality/news/news/2014/03/almost-600-000-deaths-due-to-air-pollution-in-europe-new-who-global-report

The proposed development will have several significant long-term and short-term benefits for the local economy including job creation, local authority commercial rate payments and a Community Benefit Scheme.

The annual commercial rate payments from the proposed development to Leitrim and Sligo County Councils, will be redirected to the provision of public services within those counties. These services include items such as road upkeep, fire services, environmental protection, street lighting, footpath maintenance etc. along with other community and cultural support initiatives.

It is estimated that the proposed project will create approximately 80-100 jobs during the construction phase and 2-3 jobs during the operational and maintenance phases of the proposed development. During construction, additional employment will be created in the region through the supply of services and materials to the development. In addition to this, there will also be income generated by local employment from the purchase of local services i.e. travel and lodgings.

Should the proposed development receive planning permission, there are substantial opportunities available for the local area in the form of Community Benefit Funds. Based on the current proposal, a Community Benefit Fund in the region of €5 million will be made available over the lifetime of the project. The value of this fund will be directly proportional to the installed capacity and/or energy produced at the site and will support and facilitate projects and initiatives including youth, sport and community facilities, schools, educational and training initiatives, and wider amenity, heritage, and environmental projects.

Further to the above, the recent Renewable Energy Support Scheme (RESS) Terms and Conditions, published by the Department of Communications, Climate Action and Environment on the 27th February, make some high level provisions for how this type of benefit fund will work. Any project which wants to export electricity to the national grid must abide by these broad principles. These include the following:

1. *a minimum of €1,000 shall be paid to each household located within a distance of a 1 kilometre radius from the Project;*
2. *a minimum of 40% of the funds shall be paid to not-for-profit community enterprises whose primary focus or aim is the promotion of initiatives towards the delivery of the UN Sustainable Development Goals, in particular Goals 4, 7, 11 and 13, including education, energy efficiency, sustainable energy and climate action initiatives;*
3. *a maximum of 10% of the funds may be spent on administration. This is to ensure successful outcomes and good governance of the Community Benefit Fund.*
4. *the balance of the funds shall be spent on initiatives successful in the annual application process, as proposed by clubs and societies and similar not-for-profit entities, and in respect of Onshore Wind RESS 1 Projects, on "near neighbour payments" for households located outside a distance of 1 kilometre from the Project but within a distance of 2 kilometres from such Project.*

Further details on the proposed Community Gain proposals are presented in Section 4.5 and Appendix 2-2 of this EIAR.

1.5.2 Recreational Benefits

In addition to the economic and environmental benefits of the proposed development, there will be potential social and recreational benefits associated with the recreational and amenity proposals that will form part of the project.

The proposed development and all its associated infrastructure creates a unique opportunity to develop an amenity area for use by members of the local and wider community alike. The upland nature of the site is attractive to both locals and visitors to the area. It is proposed to develop some recreational walks as part of the Croagh Wind Farm project. These proposed walks will utilise existing forest tracks, new

wind farm roads and proposes trails,a boardwalk area together with a viewing area adjacent to Lough Nacroagh. In addition, areas around the proposed amenities will be targeted for planting with broadleaves and berried trees to create areas of interest for small birds and increase the biodiversity habitat of the area.. This proposal is based on the current use of the wider area as an informal walking route; where the proposed amenity facilities will allow for a safer and improved visitor experience and allow the site to be more openly available to walkers, trail runners, cyclists and other recreational users, as outlined in Section 4.6 of Chapter 4 of this EIAR.

This will provide a long-term benefit to both the local community and visitors to the area.

1.6 Purpose and Scope of the EIAR

The purpose of this EIAR is to document the current state of the environment in the vicinity of the proposed development site and to quantify the likely significant effects of the proposed development on the environment in accordance with the requirements of the EIA Directive, as amended. 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 the competent authorities, from the EIAR and the accompanying 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 proposed development on the following:

- Population and Human Health,
- Biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC
- Land, Soil, Water, Air, Climate,
- Material Assets, Cultural Heritage and the Landscape
- Interactions between these factors.

The EIAR provides the relevant environmental information to enable the EIA to be carried out by the competent authorities. The information to be contained in the EIAR is prescribed in Article 5 of the EIA Directive, as amended and described in Section 1.4 above.

1.7 Structure and Content of the EIAR

Volume 1 of 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, ornithology soils and geology, hydrology and hydrogeology, 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.

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 and Climate
- Noise and Vibration
- Landscape and Visual
- Archaeological, Architectural and Cultural Heritage
- Material Assets (including Traffic and Transport, Telecommunications and Aviation)
- Interactions of the Foregoing
- Schedule of Mitigation and Monitoring 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.

The photomontage booklet, pertaining to Chapter 12: Landscape and Visual, is included as Volume 2 of this EIAR.

Appendices to the chapters listed above are included in Volume 3 of this EIAR.

1.7.1 Description of Likely Significant Effects and Impacts

As stated in the Draft *'Guidelines on the Information to be contained in Environmental Impact Assessment Reports'* (EPA, 2017), an assessment of the likely impacts of a proposed 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-frontier 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):

- *'Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report'* (EC, 2017)
- *'Guidelines on the Information to be contained in Environmental Impact Assessment Reports – Draft August 2017'* (EPA, 2017).
- *'Revised Guidelines on the Information to be contained in Environmental Impact Statements – Draft September 2015'* (EPA, 2015)
- *'Advice Notes for Preparing Environmental Impact Statements – Draft September 2015'* (EPA, 2015).
- *'Advice Notes on Current Practice in the Preparation of Environmental Impact Statements'* (EPA, 2003)
- *'Guidelines on the Information to be contained in Environmental Impact Statements'* (EPA, 2002)

Error! Not a valid bookmark self-reference., below, presents the glossary of impacts as published in the EPA guidance documents. Standard definitions are provided in this glossary, which permit 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 the EIAR. The consistent application of terminology throughout the EIAR facilitates the assessment of the proposed development on the receiving environment.

Table 1-2 Impact Classification Terminology (EPA, 2017)

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
	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

Impact Characteristic	Term	Description
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
	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

Impact Characteristic	Term	Description
	Irreversible	When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost
	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, duration and 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 the EIAR of 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. Further details on project team expertise are provided in the Statement of Authority at the beginning of each impact assessment chapter.

Table 1-3 EIAR Project Team

Consultants	Principal Staff Involved in Project	EIAR Input
McCarthy Keville **O' Sullivan Ltd.** Block 1 GFSC Moneenageisha Road Galway	Brian Keville Michael Watson Jimmy Green Meabhann Crowe Lorraine Meehan Eoin McCarthy Pat Roberts	Project Managers, Scoping and Consultation, Preparation of Natura Impact Statement, Report Sections: › 1. Introduction › 2. Background to the Proposed Development › 3. Consideraton of Alternatives › 4. Description of the Proposed Development

Consultants	Principal Staff Involved in Project	EIAR Input
	Dervla O' Dowd Padraig Cregg David McNicholas John Hynes James Owens Dr. Úna Nealon David Naughton Ian Hynes Joanna Mole Owen Cahill Stephen Corrigan Eoin Gilson Paul Sweeney James Newell Joseph O'Brien	› 5. Population & Human Health › 6. Biodiversity › 7. Ornithology › 10. Air & Climate › 12. Landscape & Visual › 14. Material Assets (non-Traffic) › 15. Interaction of the Foregoing › 16. Schedule of Mitigation Measures
Hydro Environmental Services 22 Lower Main Street Dungarvan Co. Waterford	Michael Gill David Broderick	Flood Risk Assessment, Drainage Design, Preparation of Report Sections: › 8. Land, Soils & Geology › 9. Water
Fehily Timoney & Company (formerly Applied Ground Engineering Consultatnts Ltd.) The Grainstore Singletons Lane	Gerry Kane Paul Jennings	Preparation of Geotechnical & Peat Stability Assessment and Peat & Spoil Management Plan

Consultants	Principal Staff Involved in Project	EIAR Input
Bagnelstown Co. Carlow		
AWN Consulting The Tecpro Building Clonsgaugh Business & Technology Park Dublin 17	Dermot Blunnie Leo Williams Mike Simms	Baseline Noise Survey, Preparation of Report Section 11: Noise and Vibration
Tobar Archaeological Services Saleen Midleton Co. Cork	Annette Quinn Miriam Carroll	Preparation of Report Section 13: Cultural Heritage and Archaeology
Alan Lipscombe Traffic and Transport Consultants Claran, Headford, Co. Galway	Alan Lipscombe	Swept Path Analysis, Preparation of Report Section14: Material Assets – Roads and Traffic

1.8.2 Project Team Members

1.8.2.1 MKO

Brian Keville B.Sc. (Env.)

Brian Keville has over 19 years' professional experience as an environmental consultant having graduated from the National University of Ireland, Galway with a first class honours degree in

Environmental Science. Brian was one of the founding directors of environmental consultancy, Keville & O'Sullivan Associates Ltd., prior to the company merging in 2008 to form McCarthy Keville O'Sullivan Ltd., and whom recently rebranded as MKO (March 2019). Brian's professional experience has focused on project and environmental management, and environmental impact assessments. Brian has acted as project manager and lead-consultant on numerous environmental impact assessments, across various Irish counties and planning authority areas. These projects have included large infrastructural projects such as roads, ports and municipal services projects, through to commercial, mixed-use, industrial and renewable energy projects. The majority of this work has required liaison and co-ordination with government agencies and bodies, technical project teams, sub-consultants and clients.

Michael Watson, MA; Miema CEnv PGeo

Michael Watson is Project Director and head of the Environment Team in MKO. Michael has over 18 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).

Jimmy Green BA, MRUP; MIPI

Jimmy Green holds the position of Senior Planner in MKO and has a wide range of experience in project management and coordination, planning research, analysis, and retail planning. Jimmy has extensive planning experience in both the public and private sectors having worked as an Assistant Planner in Donegal County Council and subsequently as both an Executive and Senior Executive Planner in Galway County Council prior to joining private practice in October 2004. Since moving into the private sector he has provided consulting services to a wide range of private and public sector clients, and his experience includes planning application project management, environmental impact assessment preparation, retail impact assessment, development potential reporting, preparation of linguistic impact statements and submissions to Development Plans/Local Area Plans. Jimmy has a Bachelor of Arts Degree in Human and Physical Geography from National University Ireland Galway and a Masters in Regional and Urban Planning from University College Dublin. Jimmy is also a corporate member of the Irish Planning Institute.

Meabhann Crowe BA (Hons.), MURP, MRTPI

Meabhann Crowe is a Project Planner with McCarthy O'Sullivan Ltd 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.

Lorraine Meehan B.Sc. (Env.)

Lorraine Meehan is a Project Environmental Scientist with MKO with over 10 years of experience. Lorraine graduated from NUI Galway in 2006 with a first class honours degree in Environmental Science and has gained extensive experience since joining the company in 2007, working primarily as an Environmental Scientist and Project Manager on a wide range of projects and plans requiring environmental assessment. Key project experience includes renewable energy projects up to 100 Megawatts (MW) in scale, electricity infrastructure, roads, waste management facilities, and municipal services projects. Lorraine's key strengths and responsibilities relate to the efficient and effective management of projects, including coordination of multidisciplinary project teams, engagement with the relevant authorities, stakeholders and members of the public on proposed and ongoing projects, organisation of extensive scoping and consultation exercises, and coordination and production of final project outputs, including Environmental Impact Statements/Environmental Impact Assessment Reports, Strategic Environmental Assessment Environmental Reports, and Constraints & Feasibility and Site Selection Studies. Within MKO, Lorraine is also involved in the training of junior members of staff and review of outputs, and completes mapping, desk studies and report-writing for a range of development and strategy-related projects.

Eoin McCarthy B.Sc. (Env.)

Eoin is a Project Environmental Scientist with McCarthy O'Sullivan Ltd. with over 8 years of environmental consultancy experience. Eoin holds B.Sc. (Hons) in Environmental Science from NUI, Galway. Eoin took up his position with McCarthy Keville O'Sullivan in June 2011. Eoin's key strengths and areas of expertise are in project management, environmental impact assessment, wind energy site selection and feasibility assessment. Since joining MKO Eoin has been involved as a Graduate, Assistant and Project Environmental Scientist on a significant range of energy infrastructure, tourism, waste permit, flood relief scheme and quarrying projects. He has overseen some of the largest SID wind energy in Ireland in recent years. In his role as project manager, Eoin 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. Eoin is also involved in the development of project strategy for the projects that he manages. He has held the role of project manager on over 500MW worth of wind energy projects. Within MKO Eoin plays a large role in the management of and sharing of knowledge with junior members of staff and works as part of a large multi-disciplinary team to produce EIA Reports.

Pat Roberts B.Sc. (Env.)

Pat Roberts is a Senior Ecologist and director of the Ecology team with McCarthy O'Sullivan Ltd. with over 14 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 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)

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

Dervla O'Dowd is a Senior Ecologist and Project Manager with McCarthy O'Sullivan Ltd. with over 14 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 B.Sc. (Zoo.), M.Sc. (Eco.)

Padraig Cregg is a Senior Ornithologist with McCarthy O'Sullivan Ltd. with over 8 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.

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

John Hynes is a Senior Ecologist with McCarthy O'Sullivan Ltd. with over 6 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 EIS Reports. John has project managed a range of strategy and development projects across the Ireland and holds CIEEM membership.

David Naughton B.Sc. (Env.)

David Naughton is an Ecologist with over two years of professional experience, working within the Ornithology Department for MKO. David graduated with an honours B.Sc. degree in Environmental Science from NUIG in 2016. David has a wide range of ecological experience including bird surveys, vegetation surveys, terrestrial invertebrate surveys, freshwater invertebrate surveys, river surveys for salmonids and other fish species, small mammal surveys and habitat identification. David is also very accomplished in GIS software systems for use in interpreting ecological data. David has experience in report writing and has been involved the production of several EIS/EIARs for various windfarm projects as well as numerous interim bird survey reports issued to clients on an ongoing basis. David has also been responsible for the production of collision risk modelling for bird activities at several windfarm sites over the past year, many of which have been peer reviewed by experts in CRM and were found to be appropriate. David's key strengths and areas of expertise are applications of GIS systems, including viewshed analysis and collision risk modelling, project management, survey planning and analysing & interpreting large scale datasets. Since joining MKO David has been involved in a wide range of various projects, acting as project manager for many bird survey projects while providing a pivotal contact link between clients and field surveyors.

Ian Hynes B.Sc. (Env.)

Ian Hynes is a Graduate Ecologist with McCarthy Keville and O'Sullivan Ltd., joining in December of 2017. Ian holds a B.Sc. (Hons) in Environmental Science from National University of Ireland, Galway. Ian has a broad knowledge of ecology including invertebrate surveys and identification, vegetation surveys, small mammal surveys and habitat identification. Ian also has over two 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 McCarthy Keville & O'Sullivan Ltd. He has been involved in a number of windfarm projects, utilizing his skills to compile data and create maps for surveys and figures.

Una Nealon PhD, B.Sc.

Úna Nealon is a Project Ecologist with McCarthy O'Sullivan Ltd. with over 9 years of experience in consultancy, research and conservation management. After gaining a first class honours degree in Environmental Science at NUIG, Úna worked as an Environmental Consultant for OES Consulting where she gained experience in multidisciplinary ecological surveys and impact assessment. In addition, she has held research roles in Tanzania and Madagascar, studying local flora and fauna, and developing conservation management plans. Before joining MKO in June 2016, she completed her PhD with the Centre for Irish Bat Research, examining the impacts of wind farms on Irish bat species. Úna's primary expertise lies in bat ecology, particularly in relation to wind farm EIA. Beyond this, she is a skilled general ecologist, with experience in flora identification, habitat classification, GIS mapping, mammal surveys, Ecological Impact Assessment and Appropriate Assessment. Since joining MKO, Úna has been responsible for managing bat survey requirements for a variety of wind and solar energy planning applications, as well as other commercial, residential and infrastructure projects. This includes scope development, roost assessments, acoustic surveying, sonogram analyses, impact assessment and report writing. Within MKO, she works as part of a multi-disciplinary team to quickly identify potential

ecological constraints and to produce EIS Reports, Appropriate Assessment Screening Reports and Natura Impact Statements. Úna is a member of the Irish Ecological Association, Bat Conservation Ireland and is Secretary of Galway Bat Group.

David McNicholas B.Sc. (Env.), M.Sc. (Env.)

David McNicholas is a Senior Ecologist at McCarthy Keville O'Sullivan, Planning & Environmental Consultants. David holds a BSc (First Class Hons) Environmental Science and an MSc (Hons) Environmental, Health and Safety Management. David has over 8 years professional ecological consultancy experience. David specialises in the preparation of EIAs, EcIAs and NISs including ecological surveys and monitoring. David has worked on all phases of wind farm development from feasibility/ scoping, ecological surveys, preparation of full EIS chapters, construction phase environmental monitoring and post-construction ecological monitoring. David has worked as an Ecological Clerk of Works (ECoW) during the construction phase of ten large scale wind farms in Ireland and Northern Ireland, gained significant experience on the implementation of the environmental and ecological measures. David is a full member of the Chartered Institute of Ecology and Environmental Management (MCIEEM).

James Owens, B.Sc.

James Owens is an Assistant Ecologist with McCarthy O'Sullivan Ltd. with over 8 years of experience in private practice. James holds BSc (Hons) in Environmental Science and BSc in Forest Management. Prior to taking up his position with McCarthy Keville O'Sullivan in March 2017, James worked as a sub-consultant ecologist while finishing a research masters in plant ecology. James also worked for a number of years in the private forestry sector and has had involvement with all stages of the forestry cycle from site selection through to felling and re-afforestation. James' key strengths and areas of expertise are in vegetation surveys, tree surveys, habitat mapping and Appropriate Assessment Screening, Natura Impact Statements and Ecological Impact Assessments. Since joining MKO James has been involved as an ecologist on a range of energy infrastructure, commercial, recreational and residential projects where he has completed AASR's, EcIA's,,NIS's and biodiversity chapters of EIA Reports along with due diligence surveys and site supervision. Within MKO James works as part of a large multi-disciplinary team on various environmental and planning projects which has involved liaising with clients and he has also assisted in business development. James holds membership with both the Botanical Society of Britain and Ireland and the Society of Irish Foresters.

Joanna Mole BSc PGDipLA MSc CMLI

Joanna Mole is a Landscape and Visual Impact Assessment Specialist and Chartered Landscape Architect with McCarthy O'Sullivan Ltd. with over 15 years of experience in both private practice and local authorities. Joanna holds a BSc (Hons) in Landscape Design & Plant Science from Sheffield University, a Postgraduate Diploma in Landscape Architecture from Leeds Beckett University, and a MSc in Renewable Energy Systems Technology from Loughborough University. Prior to taking up her position with MKO in October 2017, Joanna worked as a Landscape Architect with Kav-Banof in Israel and held previous posts with CSR in Cork, LMK in Limerick, Geo Architects in Israel and Groundwork Bridgend in South Wales. Joanna is a Chartered Landscape Architect with specialist knowledge in Landscape and Visual Impact assessments for projects ranging from individual houses to large windfarms, cycle route design and landscape contract management. Since joining MKO Joanna has been involved in projects such as energy infrastructure, extraction industry and residential projects. Joanna holds chartered membership of the British Landscape Institute since 1998 and has been an examiner for British Landscape Institute professional practice exam.

Paul Sweeney BA. MSc.

Paul Sweeney is a Graduate Planner with MKO having joined the team in April 2018. Paul holds a BA (Hons) in Geography and English and a Masters in Planning and Sustainable Development from University College Cork where he graduated in 2017. Since joining MKO, Paul has developed experience in a range of sectors through various projects and planning issues with a current focus within the Environmental and Energy sector.

Owen Cahill B.Sc., M.Sc.

Owen is an Environmental Engineer with McCarthy O'Sullivan Ltd. with over 11 years of experience in the environmental management and construction industries. Owen holds BSc. (Hons) and MSc. in Construction Management and a Masters in Environmental Engineering. Prior to taking up his position with MKO in October 2013, Owen worked as an Environmental Officer with Kepak and prior to which he held a post with Pentland Macdonald Contaminated Land & Water Specialist in Northern Ireland. Prior to working in planning and environmental consultancy, Owen was employed within the construction industry where he gained significant experience on a variety of civil, residential and commercial projects. Owen's wide ranging multi sector experience has provided him with specialist knowledge and understanding of the challenges in the planning and delivery of developments with the minimum environmental impact and with practicality and constructability in mind. Owen's key strengths and areas of expertise are in project management, environmental impact assessment, wind energy & solar energy construction & environmental management planning and waste permit management. Since joining MKO Owen has been involved as a Project Manager on a range of energy infrastructure, commercial, residential, waste facility and quarry projects as well as managing the licensing requirements of a number of EPA licensed facilities. Within MKO Owen 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 EIS Reports. Owen has project managed the Environmental Impact Assessment of a range of development projects across the Ireland and holds Affiliate Membership with the Institute of Environmental Management & Assessment and is currently awaiting interview and assessment to become a Full Member and Chartered Environmentalist.

Stephen Corrigan B.Sc.

Stephen Corrigan is an Environmental Scientist with McCarthy O'Sullivan Ltd. with over three years of experience in private and public sector positions. Stephen holds a B.SC in Environmental Science. Stephen has specialist knowledge in environmental field surveys, database management, geographic information systems and data analysis. Stephen's key strengths and areas of expertise are in data management and GIS. Since joining MKO Stephen has been involved as an Assistant Environmental scientist on a significant range of energy infrastructure and private/public development projects, hydrological and ecological monitoring projects. Within MKO Stephen has a role in site construction monitoring, report writing and database management. Stephen works as part of a large multi-disciplinary team to produce EIS Reports, operational compliance reports and monitoring reports for MKO.

Eoin Gilson B.Sc., M.Sc.

Eoin is a Graduate Environmental Scientist with McCarthy O'Sullivan Ltd. who took up his position in October 2018. Eoin holds a BSc (Hons) in Microbiology and a MSc (Hons) in Applied Environmental Science. Eoin has specialist knowledge in environmental field surveys, data analysis and renewable energy systems. Eoin's key strengths and areas of expertise are in data management, report writing and environmental monitoring and management. On joining MKO Eoin has been involved on a range of renewable energy infrastructure projects, working as part of a large multi-disciplinary team to produce EIA Reports.

James Newell

James holds the position of CAD and Information Technology Technician with MKO since joining the Company in May 2006. Prior to joining MKO, he worked as a graphic designer and illustrator for over eight years. In recent years James' role has extended to include all wind farm visual modelling completed by the company. He is proficient in the use of MapInfo GIS software in addition to AutoCAD and other design and graphics packages.

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 joined MKO in 2016 and his role entails mapping, aerial registration and detailed design drawings for renewable, commercial and residential projects. Prior to joining us, Joseph worked as a free-lance CAD Technician for various projects.

1.8.2.2 Hydro Environmental Services Ltd.

Michael Gill

Michael Gill is an Environmental Engineer with over 12 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 9 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 EIAs for a range of commercial developments.

1.8.2.3 Fehily Timoney & Company

Fehily Timoney & Company Ltd. (FT) recently acquired AGEC Ltd. adding to their growing geotechnical team. The geotechnical aspects of the report, which will be incorporated into the Geology & Soils and Water sections of the EIAR, will be completed by Fehily Timoney & Company Ltd. FT (previously AGEC) has extensive experience in the production of Peat Stability Assessments for wind energy developments. They provide 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.

Gerry Kane

Gerry Kane joined AGEC Ltd. (now part of Fehily Timoney & Company Ltd.) as a Geotechnical Engineer in 2008. Gerry graduated from IT Carlow in 2008 with a BEng (Hons) degree in Civil Engineering. Gerry is a Geotechnical Engineer with over seven years' experience in geotechnical design

and analysis, supervision and interpretation of ground investigations, foundation & earthwork design, supervision of construction of bulk earthworks and structure foundations, slope stability analysis, desk studies and walkover surveys. Previous and current experience in the wind energy field has included work for wind farm developments in Ireland, Northern Ireland, Scotland, Wales and England. This work has covered Peat Stability Assessment Reports, Soils and Geology Chapters of EIAR's, site assessments for wind farm developments and the investigation of peat failures at wind farm sites.

Ian Higgins

Ian is a geotechnical engineer with over 20 years of experience in the design and supervision of construction of bulk earthworks, geotechnical foundation design, geotechnical monitoring and reviewing, reinforced earth design, slope stability assessments 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.

1.8.2.4 AWN Consulting Ltd.

Dermot Blunnie

Dermot Blunnie (Senior Acoustic Consultant) holds a BEng. from the University of South Wales, a M.Sc. from the University of Derby and IOA Diploma in Acoustics and Noise Control from the Institute of Acoustics. He has over 11 years' experience as an acoustic consultant and is a member of the Institute of Acoustics. He has extensive knowledge and experience in relation to commissioning noise monitoring and impact assessment of wind farms as well as a detailed knowledge of acoustic standards and proprietary noise modelling software packages. He has commissioned noise surveys and completed noise impact assessments for numerous wind farm projects within Ireland.

Leo Williams

Leo Williams (Acoustic Consutlant) holds an MA in Mechanical Engineering and has completed the Institute of Acoustics (IOA) Diploma in Acoustics and Noise Control. He is also an Associate Member of the IOA. He has extensive knowledge in aspects of environmental surveying, modelling and impact assessment, particularly for wind energy developments.

Mike Simms

Mike Simms BE MEngSc MIOA MIET, Senior Acoustic Consultant at AWN, who has worked in the field of acoustics for over 19 years and has been a consultant since 1998. He has extensive experience in all aspects of environmental surveying, noise modelling and impact assessment for various sectors including, energy, industrial, commercial and residential.

1.8.2.5 Tobar Archaeological Services Ltd.

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, Annette Quinn and Miriam Carroll, 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 stage through to construction stage when archaeological monitoring is frequently required.

1.8.2.6 Alan Lipscombe Traffic and Transport Consultants

Alan Lipscombe (B.Eng. Hons.) MIHT

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 and is an accomplished analyst who has experience of a wide variety of modelling packages and methods.

1.9 Viewing and Purchasing the EIAR

Copies of this EIAR will be available online, including the Non-Technical Summary (NTS), on the Planning Section of the Leitrim County Council and Sligo County Council websites, under the relevant Planning Reference Number (to be assigned on lodgement of the application).

- Leitrim County Council: http://leitrimcoco.ie/eng/Services_A-Z/Planning-and-Development/
- Sligo County Council: http://www.sligococo.ie/planning/

This EIAR and all associated documentation will also be available for viewing at the offices of both local authorities. The EIAR may be inspected free of charge or purchased by any member of the public during normal office hours at the following address:

- Leitrim County Council,
  Áras an Chontae,
  St. George's Terrace,
  Carrick on Shannon,
  Co. Leitrim

- Sligo County Council,
  County Hall,
  Riverside,
  Sligo
  F91 Y763

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 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)

2. BACKGROUND

This section of the EIAR presents policy information on Energy and Climate Change policy and targets, the strategic planning context for the proposed development, the site selection and design process, a description of the proposed development site, size and planning history, scoping and consultation, and the cumulative impact assessment process.

2.1 Introduction

This section of the EIAR presents the various policies and targets which have been put in place at the various levels of Government both national and international in relation to renewable energy and climate change. The details below set out the need for the proposed development to aid in Ireland meeting its national targets and European commitments in relation to climate change and decarbonisation. As is discussed throughout this chapter all of the latest projections have shown that Ireland is not set to meet its 2020 targets. Within this chapter the information is presented and assessed under the following:

- Renewable Energy Resources,
- EU Legislation,
- Progress on Targets, and,
- National Energy Projections.

The proposed development comprises the provision of a wind farm which will generate renewable energy and provide it for use onto the national grid. The need to decarbonise the economy and reduce emissions has always been imperative, however, in recent years the urgency involved has become clearer to all stakeholders. The Climate Action Plan published by the Government in 2019 has clearly identified the need for and urgency of change, it states:

> *"The accelerating impact of greenhouse gas emissions on climate disruption must be arrested. The window of opportunity to act is fast closing, but Ireland is way off course.... The shift in climate is bringing profound shifts of desertification, rising sea levels, displaced population, profound challenges to the natural world, and economic and social disruption. We are close to a tipping point where these impacts will sharply worsen. Decarbonisation is now a must if the world is to contain the damage and build resilience in the face of such a profound challenge."*

The primary driver behind the proposed development is the need to provide additional renewable energy to offset the use of fossil fuels within the electricity generating sector. Increasing electricity generation from wind power represents the most economical renewable option to reduce emissions within the power generation sector and is the most mature technology available to achieve national targets that have been established for decarbonisation.

2.2 Renewable Energy Policy and Targets

2.2.1 Renewable Energy Resources

Renewable energy resources include solar, wind, water (hydropower, wave and tidal), heat (geothermal) and biomass (wood, waste) energy. These sources are constantly replenished through the cycles of nature, unlike fossil fuels, which are finite resources that are becoming increasingly scarce and expensive to extract.

Renewable energy resources offer sustainable alternatives to our dependency on fossil fuels as well as a means of reducing greenhouse gas emissions and opportunities to reduce our reliance on imported

fuels. These resources are abundantly available in Ireland, yet only a fraction has been tapped so far (Source: Sustainable Energy Authority of Ireland (SEAI) website, www.seai.ie).

A gradual shift towards increasing our use of renewable energy resources would result in:

- Reduced carbon dioxide emissions;
- Secure and stable energy for the long-term;
- Reduced reliance on fuel imports;
- Investment and employment in our indigenous renewable energy projects; often in rural and underdeveloped areas.

Renewable energy development is recognised as a vital component of Ireland's strategy to tackle the challenges of combating climate change and ensuring a secure supply of energy. Ireland is heavily dependent on the importation of fossil fuels to meet its energy needs, with imported fossil fuels accounting for 66% of Ireland's dependency in 2017 at an estimated cost of €4 billion. This high dependency on energy imports is highly risky and Ireland is currently extremely vulnerable both in terms of meeting future energy needs and ensuring price stability. ('Energy in Ireland 2018 Report', Sustainable Energy Authority of Ireland', December 2018).

2.2.2 EU Legislation

The European Union (EU) Directive on the Promotion of the Use of Energy from Renewable Sources (Directive 2009/28/EC) was adopted on 23rd April 2009. This Directive establishes a binding target of 20% of overall EU energy consumption to come from renewable sources by 2020, as well as a binding 10% minimum target for energy from renewable resources in the share of transportation fuels. Ireland's target under Directive 2009/28/EC is for renewable resources to account for 16% of total energy consumption by 2020. Directive 2009/28/EC imposes a legal obligation on each Member State to:

- Ensure that its 2020 target is met.
- Introduce "appropriate measures" and outline them in a National Renewable Energy Plan. The "appropriate measures" include ensuring that grid-related measures and administrative and planning procedures are sufficient to achieve the 2020 target. The Draft National Renewable Energy Plan for Ireland was published in June 2010.

Failure to meet EU targets on the use of energy from renewable sources could result in EU sanctions ('Jobs and Investment in Irish Wind Energy', Deloitte/Irish Wind Energy Association, 2009).

Ireland's mandatory target under Directive 2009/28/EC is for renewable resources to account for 16% of total energy consumption by 2020. This will be met by 40% from renewable electricity, 12% from renewable heat and 10% from the renewable transport sector.

2.2.2.1 2030 Climate and Energy Framework, 2014

The 2030 Climate and Energy Framework was adopted by EU leaders in October 2014 and marks a further development of EU renewable energy policy. The framework defines further EU wide targets and builds on the 2020 climate and energy package.

On the 30th November 2016, the EU Commission published a proposal for a revised Renewable Energy Directive to ensure that the target of at least 27% renewables in the final energy consumption in the EU by 2030 is met.

The European Commission published its proposal for an effort sharing regulation on the allocation of national targets for greenhouse gas emissions for the period 2021-2030 in July 2016. The proposal implements EU commitments under the Paris Agreement on climate change (COP21) which is further

discussed below and marks an important milestone in the allocation to Member States of a package of climate targets that were formally adopted as part of the 2030 Climate and Energy Framework.

The EU Climate and Energy Framework 2030, adopted by EU leaders in October 2014, sets out a policy framework for climate and energy in the period from 2020 to 2030 and aims to make the European Union's economy and energy system more competitive, secure and sustainable. The framework defines further EU wide targets and builds on the 2020 climate and energy package in setting three key targets for the year 2030 as follows:

- A binding commitment at EU level of at least 40% domestic Green House Gas reduction by 2030 compared to 1990;
- An EU wide, binding target of at least 27% renewable energy by 2030; and
- An indicative EU level target of at least 27% energy efficiency by 2030.

On the 27th of June 2018 EU ambassadors endorsed the provisional agreement reached by the Bulgarian Presidency on the revision of the renewable energy directive. The new regulatory framework is expected to pave the way for Europe's transition towards clean energy sources such as wind, solar, hydro, tidal, geothermal, and biomass energy. The agreement sets a headline target of 32% energy from renewable sources at EU level for 2030.

2.2.2.2 Progress on Targets

The overall share of renewables in primary energy in Ireland stood at 11.1% in 2018 which is up from the 2017 figure of 7.3%, and 7.9 in 2016. As per the EU Renewable Energy Directive, the target for Ireland is set at 16% share of renewable energy in gross final consumption (GFC) by 2020. As per the SEAI's Energy in Ireland 2018 Report, the contribution from renewables in 2005 was 2.8%, which as of 2017, has risen to 10.6% of the GFC. The SEAI's 2018 Report continues to note that the share of electricity from renewable energy has increased fourfold between 2005 and 2017 – from 7.2% to 30.1% – an increase of 23 percentage points over 12 years. In absolute terms, there has been a fivefold increase in the volume of renewable electricity generated from 1,873 GWh in 2005 to 8,877 GWh in 2017. Of this, it was noted that Wind energy accounted for 84% of the renewable electricity in 2017.

The June 2018 'Off Target Report' published by the Climate Action Network (CAN) Europe, which ranks EU countries ambition and progress in fighting climate change, listed Ireland as the second worst performing EU member state in tackling climate change. It also stated that Ireland is set to miss its 2020 climate and renewable energy targets and is also off course for its unambitious 2030 emissions target. The report states:

> *"Ireland has failed to prepare effective policies to align near-term climate action with EU and Paris Agreement commitments. Without new, immediate and substantive efforts to cut emissions, Ireland faces annual non-compliance costs of around €500 million."*

The Department of Climate Change, Action & Environment (DCCAE) reported in their 'Fourth Progress Report on the National Renewable Energy Action Plan' (December 2017), that Ireland will achieve 13% of its 16% RES target by 2020. SEAI in their report 'Ireland's Energy Targets – Progress, Ambition & Impacts' (April 2016) estimates that Irelands inability to achieve its 2020 renewable energy targets will result in fines of between €65 million and €130 million per percentage shortfall on its overall binding target after 2020 until it meets its targets.

The Climate Change Advisory Council similarly notes within their *2019 Annual Review* that while the share of renewable electricity generation, particularly wind, is increasing in Ireland, the pace of decarbonisation of the electricity generation sector is not compatible with a low-carbon transition to 2050. As such, Ireland can continue to 'comply' with EU targets by purchasing emission allowances; however, the expenditure of public funds to do so would not result in any domestic benefit, and furthermore, would result in a more difficult and expensive challenge for the county to meet its future

2030 targets and beyond. The *Review* concludes that continued and additional investment in capacity and technologies in the renewable energy sector is required to reach these said targets.

Plate 2.1 shows the latest data available for the share of renewable energies in gross final energy consumption according to the Eurostat online data and the targets that have been set for 2020. The share of renewables in gross final energy consumption stood at 18.0% in the EU-28 in 2018. The data shows that twelve member states have reached a share equal to or above their 2020 target. This is not the case with Ireland who, as evident in Plate 2.1, are still considerably below meeting its 2020 target. Per the 2018 data Ireland was at 11.1% of its 16% target.

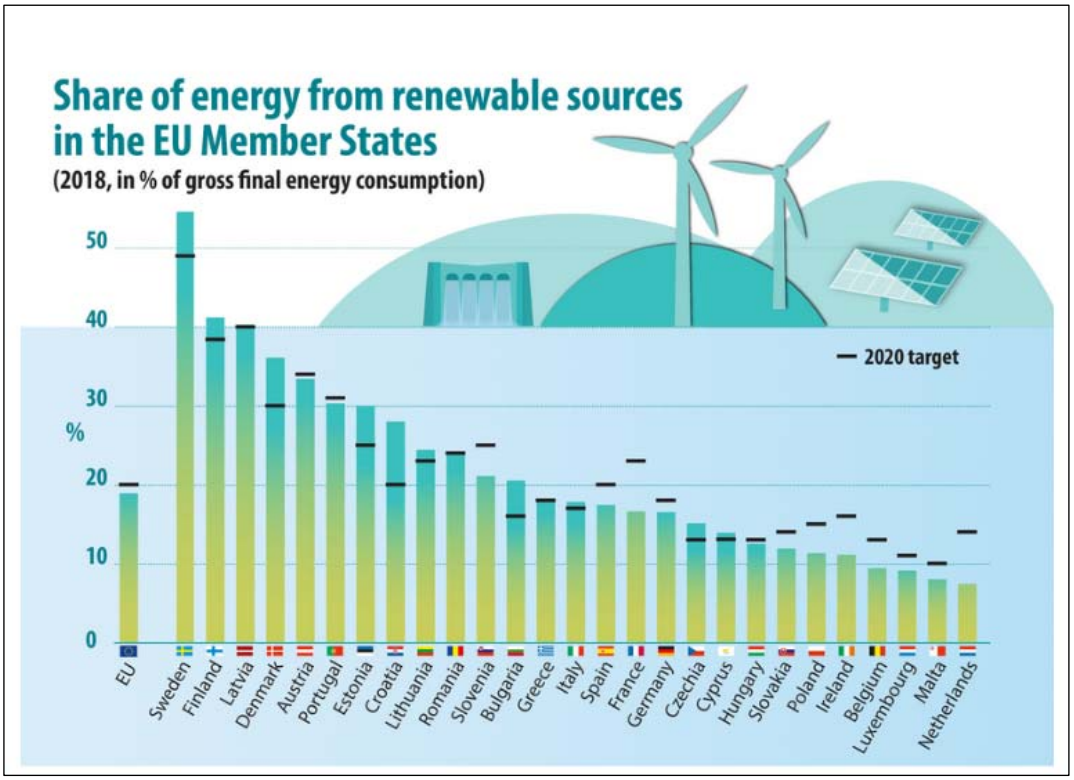

Plate 2-1 Share of energy from renewable sources, 2018

EirGrid in their '*All Island Generation Capacity Statement 2019 - 2028*' (September 2019), state that, in the absence of the National Energy and Climate Plan 2021 – 2030, it is assumed that renewable targets will be achieved largely through the deployment of additional wind powered generation in Ireland. New wind farms commissioned in Ireland in 2018 brought the total wind capacity to over 3666 MW, contributing to the increase in overall RES-E percentage to 32.5%, with wind energy accounting for 27.6%. EirGrid estimates that between 3.9 – 4.4 Gigawatts (GW) of wind may be required to meet the 2020 Renewable Energy Supply - Electricity (RES-E) target of 40%.

It is noted by EirGrid within their 2019 – 2028 statement that, at a median demand level, Ireland does not have adequate generation capacity to meet demand from 2026 once Moneypoint closes, and should any other plant close prior to this, earlier deficits may arise. This is especially pertinent with regard to the recent announcement that the Electricity Supply Board intends to close the peat-fired Shannonbridge and Lough Ree Power Stations at the end of 2020. In this context, the importance of wind energy becomes more apparent as it is estimated that 1 MW of wind capacity can provide enough electricity to supply approximately 650 homes[1].

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. Specifically, there is currently 1000 MVA

[1] *https://www.iwea.com/about-wind/faqs*

demand capacity that is contracted to data centres and other large energy users. 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 shows that demand from data centres could account for 29% of all demand by 2028 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 which is indicative of additional data centre projects drawing demand from the grid and we are therefore closer to the higher demand scenario. It should be noted that each MW of additional data centre load will add at least 1 MW of wind to the 40% RES-E 2020 target[2]. Alternatively, 3 MW of wind could be required per MW of data centre electricity demand, if the data centre wants to commit to being powered by 100% renewable energy. Many data centres have made such commitments and have well-publicised company policies to use only renewable electricity for their power needs.

In October 2015, the Irish Wind Energy Association (IWEA) commissioned a study titled *'Data-Centre Implications for Energy Use in Ireland'* and concluded that an additional 1 GW of electricity demand may be required in Ireland by 2020 due to growth in data centres.

2.2.2.3 National Energy Projections - SEAI 2019

The SEAI National Energy Projections 2019, published in May 2019, details that in 2005, 5% of Ireland's energy came from renewable sources, in 2019 it is estimated that approximately 13% of Ireland's energy will be generated by renewable sources which is below the required 16% target.

The report details that there is still a significant way to go to achieving our European target of 16% and Ireland will not meet EU 2020 targets. Compared to other European countries Ireland was 22nd out of the EU-28 for overall renewable energy share and 26th out of the EU-28 for progress towards overall 2020 renewable energy target.

In the context of climate change the report states that:

> *"Climate change is now recognised as the biggest threat to life on earth, and it is now urgent that we take immediate action to reduce anthropogenic emissions of greenhouse gases to limit its damaging effects."*

With regard to the production of electricity it is noted that while Ireland has had considerable success in increasing the share of renewables in electricity generation that there is a need to continue to achieve in this sector and take full advantage of the country's abundant resources. The report also notes that as per the latest EirGrid Generation Capacity Statement there is a prediction of an increase of demand in the short terms with 3% to 5% per year listed.

The SEAI report states that the Renewable Energy Support scheme aims to increase the deployment rate, support up to 4,500 megawatts of additional renewable electricity by 2030 and diversify the renewable electricity portfolio. Policy measures that could help to meet the Government increased ambition include:

- Expediting the adoption of clear, and time bound, licensing and consenting procedures for off shore renewable energy development.
- Addressing technical grid challenges to incorporating very high levels of asynchronous renewables, for example via EirGrid's Delivering a Secure, Sustainable Electricity System (DS3) programme.

[2] *Data centres have high load factors of around 80%. Ech 1MW uses 24 x 365 x 80% = 7GWh. EU targets require that 40% or 3GWh of that should come from renewables. A 1MW wind turbine produces roughly 3GWh/yr.*

- Creating a clear, and timely, grid connection access and concession regime for offshore and new onshore renewable energy development, with due regard for methods by which the State can most cost effectively reduce or manage risk.
- Creating markets for grid services such as energy storage and other services supporting high levels of renewables on-grid.
- Supporting onshore wind farms reaching end of life, by providing clarity for re-powering investment decisions intertwined with new wind guidelines.
- Assisting the timely delivery of increased interconnection.
- Establishing corporate power purchase agreements mechanisms with mandated minimum renewable energy purchases or self-generation for large electricity demand users to leverage private investments in renewable electricity.
- Encouraging prosumers by consideration of communication methods, market mechanisms, market rules, frameworks and setting a price for export to the grid from point source generation, in line with the ambitions outlined in the Clean Energy Package.
- Developing community energy and small-scale renewable generation projects to enable a shift to a more distributed generation system with demand response capabilities.

Section 9 of the report details the effort which must be made for closing the gaps to targets. It is detailed that 'given the cumulative nature of emissions, an immediate acceleration of emissions reductions is required to put Ireland on the committed long-term trajectory'. Included as part of this is the country's commitments under the Paris Agreement. Further to this:

> *"Increased ambition and delivery targets supporting a sustainable energy transition are anticipated to be included in the upcoming All of Government Climate Action Plan being produced by DCCAE."*

It is noted under the strategy that to achieve the level of ambition set for 2020 and 2030 the country will be dependent on:

- Increased deployment rates of sustainable energy technologies and practices across the entire economy.
- The development of a national training and skills strategy to support growth of the clean energy technology sector.
- Support for changes in business models, nascent clean energy technology supply chains and the addressing of existing market failures.
- Early resolution of planning and regulatory barriers, including continued public engagement, and the development of appropriate market structures – especially for electrification of heat and transport supported with high levels of renewable electricity.
- Significant mobilisation of private investment in renewable energy and energy efficiency –additional spend on efficiency is known to achieve multiple benefits including warmer, healthier and more cost-effective buildings.
- The acceleration of innovation and technology adoption, especially in the area of electricity demand response, grid flexibility and storage.
- The exploitation of advances in Information Communications Technology (ICT) and national strengths in this field to advance renewables and energy efficiency, particularly in relation to passenger mobility solutions.
- Aggressively adopting the 'avoid, shift and improve' transport energy policy principles – this involves managing mobility demand to avoid trips or a shift to the most efficient modes, plus improving the energy efficiency of vehicles as well as reducing the carbon intensity of fuels.
- Taking in the ethical cost of carbon consideration in all aspects of public and private enterprise planning, involving the enforcement of the polluter pays principle by including the negative external costs associated with emissions such as healthcare or environmental reparation costs.

- An approach to carbon neutrality in the agriculture and land-use sector, including forestry, that does not compromise capacity for sustainable food production.
- The promotion of an environmentally aware and concerned citizen and community ideology to combat climate change, including recognition of the impact of diet and consumerism on climate change.

2.2.2.4 SEAI Energy in Ireland 2019 Report

In December 2019 SEAI produced the Energy in Ireland 2019 report, which provides the most up to date figures available (from 2018) in relation to energy production and consumption in Ireland. The report found that despite the increase in energy demand energy-related CO2 emissions fell slightly mainly due to (a) a reduction in the amount of coal used for electricity generation (arising from a technical fault at Moneypoint – Ireland's only coal-fired electricity generation plant) combined with (b) increased contributions from wind generation. In relation to renewable energy targets, the 2019 report found that:

- The share of electricity generated from renewable sources increased by 3.1 percentage points in 2018, to 33.2%. The 2020 target being 40%.
- The share of energy used for transport from renewable energy resources decreased from 7.4% in 2017 to 7.2% 2018. The 2020 target is 10%.
- The share of energy used for heat from renewable resources decreased from 6.7% in 2017 to 6.5% in 2018. The 2020 reduction target is 12%.

Furthermore the 2019 report also found that wind generation accounted for 28.1% (normalised) of all electricity generated. It was the second largest source of electricity generation in 2018 after natural gas. Wind energy accounted for 84% of the renewable energy generated in 2018. At the end of 2018 the installed capacity of wind generation reached 3,676MW, and during 2018 358MW of wind capacity was installed. The SEAI 2019 report also makes the following statements:

> *"EirGrid and ESB Networks note that as of 2019 there is 1,873 MW of additional wind generation planned, either with connection contracts in place or applications for connection underway. Historically, there has been a maximum of just over 500 MW installed in any one year since 2005 and on average the installation rate has been 200 MW."*

> *"In relation to the displacement of fossil fuels by renewable energy, it is estimated that in 2018 approximately €623 million in fossil fuel imports were avoided, of which €432 million was avoided by wind generation."*

In relation to the findings of this December 2019 SEAI report it is clear that wind energy represents the strongest and most deployable renewable energy resource available to reduce dependence on fossil fuels in Ireland. While it is clear that additional deployment is on-going, it is also apparent that it is unlikely that the 2020 targets for renewable electricity generation will be met. Achieving targets becomes even more challenging in the context of increasing electricity demand.

The proposed development represents an opportunity to bring forward an additional renewable energy source which will contribute towards achieving further decarbonisation of the electricity generation sector.

2.2.3 National Energy Policy

2.2.3.1 Introduction

This section of the EIAR provides a breakdown of national energy policy with regards to the proposed development. Under the national policy energy section the following are discussed: