Planning and Environmental Consultants

Environmental Impact Assessment Report – Non-Technical Summary

Proposed Ballivor Wind Farm, Co. Meath & Co. Westmeath

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NON-TECHNICAL SUMMARY

Introduction

This Environmental Impact Assessment Report (EIAR) has been prepared by McCarthy Keville O'Sullivan Ltd. (MKO) on behalf of Bord na Móna Powergen Ltd., as part of an application for planning permission for the construction of a wind energy development and all associated infrastructure (the Proposed Development) located within the Ballivor Bog Group on the border of Counties Meath and Westmeath.

The townlands within which the Proposed Development falls are listed in Table 1.

Table 1 Townlands within which the Proposed Development is located.

Wind Farm Site	
Bracklin	Craddanstown
Clondalee More	Derryconor
Clonleame	Grange More
Clonmorrill	Killagh
Clonycavan	Lisclogher Great
Cockstown	Riverdale
Coolronan	Robinstown
Haul Route Temporary Accommodating Works Areas	
Moyfeagher	Doolystown

The Proposed Development, known as Ballivor Wind Farm, will be located on Ballivor bog, Carranstown bog, Bracklin bog, Lisclogher bog and agricultural land adjacent to Bracklin bog.

The 'Application Site' which comprises the proposed wind farm site and two areas of temporary accommodating works along the haul route is illustrated on Figure 1-1.

The 'Wind Farm Site Boundary' for the purposes of this EIAR corresponds with the red-line boundary of the wind farm site proper and encompasses an area of approximately 1,770 hectares. This is illustrated on Figure 1-2. The permanent the area of the wind farm site is 1,770ha and the total area of the permanent footprint of the Proposed Development is 32.4ha or less than 1.8% of the entire wind farm site boundary.

The Proposed Development will encompass 26 No. wind turbines with a tip height of 200m and will have a total Megawatt Export Capacity (MEC) in the range of 117MW – 169MW. A total of 10. no turbines fall within Co. Meath and 16 no. turbines fall within Co. Westmeath. On the, April 5th, 2022, An Bord Pleanála determined that the Proposed Development falls within the scope of Strategic Infrastructure Development under Section 37A of the Planning and Development Acts 2000 to 2022.

The Proposed Development, known as Ballivor Wind Farm, will be located on Ballivor, Bracklin, Lisclogher and Carranstown Bogs which are located on the Meath and Westmeath border and form part of the overall Derrygreenagh Bog Group. The Wind Farm Site Boundary covers approximately 1,770 hectares and measures approximately 9 kilometres (km) in length from north to south and approximately 6 km from east to west at its widest point. It has a topography range between 69 metres above ordnance datum (m AOD) at its lowest point to approximately 84 m AOD at its highest point. The closest settlements to the site are Delvin located 5km north, Raharney, 4km west and Ballivor, 3.5km east of the site. Please see Figure 1-1 for the location of the Proposed Development.

The landcover within the Wind Farm Site Boundary is a mixture of bare cutaway peat, re-vegetated bare peat, degraded blanket bog, scrub, low woodland and remnants of high bog. Approximately 18.9km of Bord na Móna permanent fixed gauge rail lines can be found running through Ballivor, Bracklin and Carranstown Bogs.

Current activities onsite include site management and environmental monitoring as required under Integrated Pollution Control (IPC) Licence P0-501 from the Environmental Protection Agency (EPA) and temporary wind measurement (via a single 100m meteorological mast on Lisclogher Bog). Active peat extraction under IPC Licence No. 501 ceased at the Wind Farm Site in June 2020. Previously extracted stockpiled peat continues to be removed off the bogs and this is expected to be completed by 2024.

Condition 10 of the IPC licence instructs the Applicant to produce draft peatland rehabilitation plans for each bog of the Derrygreenagh Bog Group, within which the Wind Farm Site Boundary is located, upon cessation of peat extraction. These draft plans will be agreed by the EPA prior to implantation. Please see Appendix 6-6 for the draft Cutaway Bog Decommissioning and Rehabilitation Plans for Ballivor, Bracklin, Carranstown and Lisclogher Bogs

Electricity grid infrastructure in the area includes the 110kV Mullingar to Corduff overhead line that traverses the Proposed Development site at Carranstown Bog. It is proposed to construct a 110kV substation in Carranstown Bog under this overhead line to connect the Ballivor Wind Farm to the national grid.

Need for the Proposed Development

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

The proposed Ballivor Wind Farm development provides the opportunity to capture an additional part of Irelands valuable renewable wind energy resource. If the Proposed Development were not to proceed the opportunity to capture this renewable energy resource would be lost, as would the opportunity to contribute to meeting Government and EU targets for the production and consumption of electricity from renewable resources and the reduction of greenhouse gas emissions.

The opportunity to generate local employment and investment associated with the Proposed Development would also be lost, and the local economy would continue to rely primarily on agriculture and commercial forestry as the main source of income.

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;*

2. *A requirement to increase Ireland's national energy security as set out in Ireland's Transition to a Low Carbon Energy Future 2015-2030[1];*
3. *A requirement to diversify Ireland's 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);*
4. *Climate Action Plan 2023 which aims to ensure that Ireland achieves its legally binding target (the Climate Action and Low Carbon Development (Amendment) Act 2021) of net-zero greenhouse gas emissions no later than 2050, and a reduction of 51% by 2030,*
5. *Increasing energy price stability in Ireland through reducing an over reliance on imported fossil fuels; and*
6. *Provision of cost-effective power production for Ireland which would deliver local benefits.*
7. *To facilitate the Government in meeting its ambitious 80% renewable energy target by 2030.*

Economic Benefits

It is estimated that the proposed Ballivor Wind Farm, with a potential installed capacity in the range of 117MW to 169MW which will result in the net displacement of between approximately 6,035,010 tonnes and 8,717,237 tonnes of Carbon Dioxide (CO_2) per annum (Against EU FFC). The carbon offsets resulting from the Proposed Development are described in detail in Chapter 10: Air and Climate.

The Proposed Development will have both long-term and short-term benefits for the local economy including job creation (estimated at 100-120 jobs during the construction, operational and maintenance phases of the Proposed Development), local authority commercial rate payments and a Community Benefit Scheme.

Ballivor wind farm will involve an in excess of €100 million investment in Irish renewable energy infrastructure. Further to the above, the Renewable Energy Support Scheme (RESS) Terms and Conditions, published by the Department of Communications, Climate Action and Environment on the 27th February 2021, 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 Community Gain proposals are presented in Section 4.4 of Chapter 4 this EIAR. The above terms and conditions may be subject to change in RESS processes in the future or may be replaced by terms dictated by specific Power Purchase Agreements (PPAs).

[1] *Department of Communications, Energy and Natural Resources. December 2015. Ireland's Transition to a Low Carbon Energy Future 2015-2030*

There are substantial opportunities available for areas where wind farms and other types of renewable energy developments are located, in the form of Community Gain Funds. Based on the current proposal, a Community Gain Fund in the region of €14 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.

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 proposed Recreational Amenity pathway. The Proposed Development and all its associated infrastructure create a unique opportunity to develop an amenity area for use by members of the local and wider community alike. The peatland habitat within the bogs is attractive to both locals and visitors to the area because of its history and variety of vegetation. The proposed wind farm roads (28km) will be open to the public for walking and cycling and an additional 3.3km of dedicated amenity tracks will be constructed/upgraded. Three amenity carparks (with bicycle rack facilities) will be provided across the site. This proposal will provide a safe site and openly available recreational area for walkers, trail runners, cyclists and other recreational users, as outlined in Appendix 4-4 of this EIAR. The Proposed Development will also facilitate linkages to the wider area and to both existing and proposed amenity walkways. This will provide a long-term benefit to both the local community and visitors to the area.

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.

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. *Archaeological, Architectural and Cultural Heritage*
13. *Landscape and Visual*
14. *Material Assets (including Traffic and Transport, Telecommunications and Aviation, Utilities, Waste Management)*
15. *Vulnerability of the Project to Major Accidents and Natural Disasters*
16. *Interactions of the Foregoing*
17. *Schedule of Mitigation and Monitoring Measures*

A Natura Impact Statement and Construction Environment Management Plan 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 section of the EIAR sets out the relevant Energy and Climate Change policy and targets, the strategic, regional, and local planning context for the Proposed Development, information relating to scoping and consultation, and the cumulative impact assessment process. A description of reasonable alternatives studied by the developer, relevant to the project including renewable energy technologies, turbine numbers, layout and design is included at Chapter 3 of this EIAR.

The policies and targets which have been put in place at the various levels of Government in relation to renewable energy and climate change illustrate the need for the Proposed Development to assist Ireland in meeting its national targets and European commitments in relation to climate change and decarbonisation.

The Proposed Development comprises the provision of a wind farm of 26 no. wind turbines (each with an expected generating capacity of c. 4.5 to 6.5MW of renewable energy) and provide renewable energy for use on 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 (CAP) published by the Government in 2023 sets out the detail for taking action to achieve a 51% reduction in overall greenhouse gas emissions by 2030, and to reach net-zero emissions by no later than 2050. The 2023 Plan builds on the measures and technologies set out in the 2019 Climate Action Plan to deliver greater ambition. The greater ambition requires a greater range of measures under the 2023 Plan, reflected in two categories of 'core measures' and 'further measures'. 'Core measures', set out to meet the 2030 targets, cover the fundamentals of decarbonisation and include the development of a renewable energy electricity supply. These 'core measures' are not, by themselves, sufficient to deliver the ambitions set out in the CAP and so a series of 'further measures' will also be necessary which are more technically challenging or not yet available in Ireland at the scale required, e.g. Biogas/biomethane, green hydrogen, carbon capture and storage. While deploying all the core measures would reduce emissions by 10-11 MtCO2eq. by 2030, undertaking further measures could close the gap. All sectors will have to further their efforts from those outlined in the CAP if the core and further measures are to be achieved.
More recently, the National Energy Security Framework (DECC, April 2022) highlights clearly the impacts the Russian invasion of Ukraine and the resulting war has had on Europe's energy system. The resulting decision by the European Union to phase out the import of Russian gas, oil and coal has brought to the fore the importance of security of supply and how energy policy is designed for long-term resilience. It takes account of the need to decarbonise society and economy, to reduce Ireland's emissions by 51% over the decade to 2030 and reach net zero emissions by 2050. According to the SEAI's Energy in Ireland (2020) report, oil accounts for 54% of Ireland's primary energy requirement making it one of the highest rate of oil dependency in the EU. The International Energy Agency, of which Ireland is a member country, includes a 10-point plan to cut oil use which calls for an acceleration in the deployment of wind and solar projects. Ireland's response per the Framework is set out over three themes:

- Theme 1 – managing the impact on consumers and businesses
- Theme 2 – ensuring security of energy supply in the near-term
- Theme 3 – reducing our dependency on imported fossil fuels in the context of the phasing out of Russian energy imports across the EU

In relation to theme 3 the Framework highlights that replacing fossil fuels with renewables, including wind energy, will be a focus area of work. The Framework calls for "Supportive policies across Government

and State agencies" which "can reduce barriers and fast track permitting for renewable energy generation projects. Similarly, renewable energy developers need to match this through taking a leadership role in delivering high quality applications to relevant consenting authorities, meeting project milestones on time and minimising delays." Response 25 set out is in relation to the alignment of all elements of the planning system to support accelerated renewable energy development.

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.

Energy and Climate Change Targets

Relevant to the Proposed Development, the Climate Action Plan 2023 ('the CAP') launched in December 2022, sets out a roadmap to delivery on Ireland's climate ambition. The Climate Action and Low Carbon Development (Amendment) Act 2021 commits Ireland to a legally binding target of net-zero greenhouse gas emissions no later than 2050, and a reduction of 51% by 2030. At the time of publication (December 2022), the key sources of Ireland's greenhouse gas (GHG) emissions include agriculture (33.3%), transport (15.7%) and energy (14.4%). Current and future actions require "*the full implementation of measures from Climate Action Plans 2023, and further future Climate Action Plans.*"

In relation to the generation of electricity, the CAP emphasis the continued role of onshore wind in addressing the decarbonisation of the electricity sector. Under the CAP onshore wind targets of 6GW by 2025 and 9GW by 2030 is set out. An increase in the deployment of renewable energy generation, transformational policies, measures and actions are all called for in the CAP. Achieving further emissions reductions between now and 2030 requires a "*major step up*" across three key measures as follows:

- *Accelerate and increase the deployment of renewable energy to replace fossil fuels;*
- *Deliver a flexible system to support renewables and demand;*
- *Manage electricity demand.*

The CAP acknowledges that "*Ireland accommodates one of the highest global percentages of variable renewable generation on the grid. However, to maximise the output of renewables, the electricity system must increase its flexibility further."*

Local policy

The site of the Proposed Development falls across Co. Meath and Co. Westmeath. As such, Meath County Development Plan 2021-2027 and Westmeath County Development Plan 2021-2027 are the relevant local planning policy frameworks.

The Development Plans recognise the importance of addressing climate change. The policies and objectives set out within the Development Plans have maintained strong linkages with the key aims and themes set out within the previous development plans. Climate change is emphasised as one of the greatest global challenges with both Meath and Westmeath Councils acknowledging that continual action is needed for Meath, Westmeath and Ireland as a whole to become a low carbon and climate resilient Nation.

Section 6.15.3.6 of the Meath County Development Plan (MCDP) discusses energy efficiency and clarifies that the Local Authority will support the concept of generating renewable energy at local level, in this regard the MCDP states that the Council will endeavour:

- *"To promote the rational uses of energy;*

- *To promote renewable energy;*
- *To promote and disseminate energy information;*
- *To protect the environment;*
- *To reduce energy waste in all sectors of society, and;*
- *To encourage the replacement of imported fossil fuels with regionally generated renewable energy in an effort to ensure security of energy supply, where it is feasible"*

A landscape character assessment for Co. Meath divides the county into 4 No. Landscape Character Types which are further subdivided into 20 distinct Landscape Character Areas (LCAs). The Proposed Development is located in the 'Lowland Areas' Landscape Character Type and LCA 15 - South West Lowlands. LCA 15 is described as having a 'Medium' capacity to accommodate wind turbines. The LCA states the following in relation to LCA 15:

> *"Medium potential capacity to accommodate wind farms or single turbines because views within this LCA are generally short range and limited by topography and vegetation so there are opportunities for choosing locations where visual impacts are minimal. However, such development could cause the loss or degradation of hedgerows and trees and archaeology so location will be a critical consideration".*

Section 10.23 of the Westmeath County Development Plan deals specifically with wind energy and notes the following:

> *"The Council recognises the importance of wind energy as a renewable energy source which can play a vital role in achieving national targets in relation to reductions in fossil fuel dependency and therefore greenhouse gas emissions and seeks to enable renewable and wind energy resources of County Westmeath to be harnessed in a manner that is consistent with proper planning and sustainable development of the area."*

Map 69 of the Westmeath Development Plan illustrates the wind energy development capacity of the 11 LCAs for County Westmeath and categorises the LCA within which the Proposed Development is located, the River Deel Lowlands, as has having a *Low Capacity*. It should be noted that all LCAs are considered Low Capacity except for LCA 9: Uisneach (No Capacity).

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 been taken into account during the design of the Proposed Development and the preparation of this EIAR.

The aim of these guidelines is to assist the proper planning of wind power projects in appropriate locations around Ireland. The Guidelines highlight general considerations in the assessment of all planning applications for wind energy. They set out advice to planning authorities on planning for wind energy through the development plan process and in determining applications for planning permission. They contain guidelines to ensure consistency of approach throughout the country in the identification of suitable locations for wind energy development.

Each wind project has its own characteristics and defining features, and it is therefore impossible to write specifications for universal use. Guidelines should be applied practically and do not replace existing national energy, environmental and planning policy.

Following the 2013 consultation and subsequent detailed engagement between the relevant Government Departments, a "preferred draft approach" to inform and advance the conclusion of the review of the 2006 guidelines was announced in June 2017. The Department of Housing, Planning and Local Government published the *Draft Wind Energy Guidelines* in December 2019 and these Draft Wind Energy Guidelines were under public consultation until 19th February 2020.

The design of the proposed project has taken account of the "preferred draft approach" as articulated by the Department in June 2017, and accordingly, has been developed with the provisions of the current Draft Wind Energy Guidelines (2019). At the time of writing the revised wind energy development guidelines have yet to be published as a final document and have yet to be adopted.

Until new Guidelines are published the relevant guidelines remain those published in 2006. Notwithstanding this, however, where possible the Draft Wind Energy Guidelines have been used to inform the design of the Proposed Development

While the 2006 Guidelines remain the relevant guidelines in place at the time of lodgement, and decision makers (Planning Authorities and ABP) are required to have regard to them, they are not bound to apply their provisions and they can (and do), where there is sufficient justification, consider updated standards/requirements/specifications in assessing impacts and the proper planning and sustainable development of the area.

Planning History

The 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 set out in Section 2.3 of Chapter 2 of the EIAR.

Scoping and Consultation

Scoping is the process of determining the content, depth and extent of topics to be covered in the environmental information to be submitted to a competent authority for projects that are subject to an Environmental Impact Assessment. This process is conducted by contacting the relevant authorities and Non-Governmental Organisations (NGOs) with interest in the specific aspects of the environment with the potential to be affected by the proposal. These organisations are invited to submit comments on the scope of the EIAR and the specific standards of information they require. Comprehensive and timely scoping helps ensure that the EIAR refers to all relevant aspects of the subject development and its potential effects on the environment and provides initial feedback in the early stages of the project, when alterations are still easily incorporated into the design. In this way scoping not only informs the content and scope of the EIAR, it also provides a feedback mechanism for the proposal design itself.

A scoping report, providing details of the application site and the subject grid connection, was prepared by MKO and circulated in 2020 to relevant parties and follow up information was issued to relevant stakeholders during 2021 and 2022. The scoping report issued provided information on the topics below and is included in this EIAR.

- Description of the Proposed Development Site, including Site Location and Access, Land-Use, Designated Areas and Landscape Policy;
- Planning Context;
- Site Selection;
- Description of the Proposed Development; and
- Scope of the EIAR and Natura Impact Assessment

MKO requested the comments of the relevant personnel/bodies in their respective capacities as consultees with regards to the EIA process. Details of that scoping progress can be found at Section 2.4 of this EIAR.

Scoping responses received are set out in Appendix 2-1 of this EIAR. The recommendations of the consultees have informed the EIAR preparation process and contents of same.

Cumulative Impact Assessment

To gather a comprehensive view of cumulative impacts on these above environmental considerations and to inform the EIA process being undertaken by the consenting authority, each relevant chapter within the EIAR addresses the potential for cumulative effects where appropriate. Section 2.5 of Chapter 2 sets out the approach taken in relation to the methodology for the cumulative impact assessment of the Proposed Development and other relevant developments other projects.

The cumulative impact assessment of projects has three principle aims:

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

Assessment material for the cumulative impact assessments carried out within this EIAR was compiled in relation to the relevant developments within the various zones of sensitivity of, and to, the Proposed Development from which there may be potential for cumulative impacts to arise. The material was gathered through a search of relevant online planning registers, reviews of relevant EIS/EIAR documents, planning application details and planning drawings, and served to identify past and future projects, their activities and their environmental impacts.

The cumulative impact assessments carried out in each of the subsequent chapters of this EIAR consider all potential significant cumulative effects arising from all land uses in the vicinity of the Proposed Development. These include permitted and existing wind farms in the area, and drainage/maintenance works/programmes. Overall, the Proposed Development has been designed to mitigate impacts on the environment and other mitigation measures are set out within the EIAR. The mitigation measures set out in this EIAR will ensure that significant negative cumulative effects do not arise during the construction, operation, or decommissioning phases of the Proposed Development. Additional detail in relation to the potential significant cumulative effects arising and, where appropriate, the relevant mitigation measures proposed are set out within each of the relevant chapters of this EIAR.

Consideration of Reasonable Alternatives

Article IV of the EIA Directive as amended by Directive 2014/52/EU states that the information provided in an Environmental Impact Assessment Report (EIAR) should include 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.

An alternative land-use option to the development of a renewable energy project at the Proposed Development site would be to leave the site as it is, with no changes made to existing land-use practices. In implementing this 'Do-Nothing' alternative, the site would continue to be managed under the requirements of the relevant IPC licence and therefore the ongoing site management and environmental

monitoring, peat stockpile removal (due to be completed by 2024), and wind measurement would continue. In addition, if the Proposed Development were not to proceed, the implementation of peatland rehabilitation plans as required under IPC License would occur. Likewise, the PCAS scheme in adjacent Bogs (where selected) would continue to be implemented. These land uses and activities will also continue if the Proposed Development does proceed.

In implementing the 'Do-Nothing' alternative, however, the opportunity to capture a significant part of County Meath and Westmeath's renewable energy resource would be missed at this time, as would the opportunity to contribute to meeting Government and EU 2030 targets for the production and consumption of electricity from renewable resources and the reduction of greenhouse gas emissions. The opportunity to generate local employment, development contributions, and rates would also be forgone. Also, the proposed amenity access points and associated carparks would not be constructed as part of the Proposed Development and therefore this recreational opportunity would be lost.

Bord na Móna owns circa 80,000 hectares of land, primarily in the midlands of Ireland. An assessment of potential future uses of this landbank was published by Bord na Móna in 2011 in a document entitled *'Strategic Framework for the Future Use of Peatlands'*. This report identifies the potential for the development of renewable energy (in particular Wind Energy) and other developments on Bord na Móna lands. The Project Ireland 2040 National Planning Framework identifies a range of key future planning, development and place-making policy priorities for the Eastern and Midland Region that includes:

> *"Harnessing the potential of the region in renewable energy terms across the technological spectrum from wind and solar to biomass and, where applicable, wave energy, focusing in particular on the extensive tracts of publicly owned peat extraction areas in order to enable a managed transition of the local economies of such areas in gaining the economic benefits of greener energy."*

Consequently, when considering suitable locations for the Proposed Development, the assessment was confined to lands within the Bord na Móna landholding only as these lands have been identified in a national and regional context as being suitable for this type of development. Bord na Móna conducted a technical review of lands which are either cut away or will be cut away before 2030. Following a site-specific assessment it was determined that the Ballivor Bog Group is one of the suitable sites for wind energy development with a low potential for environmental effects and proximity to a potential grid connection.

Solar energy is an alternative source of renewable electricity generation that could be considered for this site; however, to achieve the same energy output, a solar development would require a significantly larger footprint. In addition, a solar development would have a higher potential environmental effect on Hydrology and Hydrogeology, Traffic and Transport (construction phase) and Biodiversity (habitat loss). For this reason, wind energy is considered the most suitable renewable electricity generation option for the site.

The proposed wind turbines will have a potential power output in the 4.5 – 6.5 -megawatt (MW) range. It is proposed to install 26 turbines at the site which could achieve approximately 117 MW to 169 MW output. Such a wind farm could also be achieved on the proposed site by using smaller turbines (for example 3.8 MW machines). However, this would necessitate the installation of between 30 and 44 turbines to achieve a similar output.

This greater turbine quantity would result in the wind farm occupying a greater footprint, with a larger amount of supporting infrastructure required (i.e. roads etc.), increasing the potential for negative environmental impacts to occur on biodiversity, hydrology and traffic and transportation. Likewise, smaller turbines would fail to make the most efficient use of the wind resource passing over the site. The 26 turbines with a 200m tip height proposed for Ballivor takes account of all site constraints and the distances to be maintained between turbines and features such as roads and houses, while maximising the wind energy potential of the site. The 26-turbine layout selected for the site has the smallest

development footprint of the other alternatives considered, while still achieving the optimum output at a more consistent level than would be achievable using different turbines.

Alternatives to the layout of the turbines and ancillary infrastructure were also considered for the proposed Ballivor Wind Farm. The final design takes account of all site constraints (e.g. ecology, ornithology, hydrology, peat depths etc.) and design constraints (e.g. setback distances from houses and third-party lands/infrastructure and distances between turbines on-site etc.). It also takes account of the results of all site investigations and baseline assessments that have been carried out during the EIAR process in addition to feedback from the relevant statutory and non-statutory organisations, local authorities and ongoing discussions with the local community.

Alternative transport routes for the delivery of wind turbine components were assessed as part of the design of the Proposed Development. The proposed route was considered to be the preferred route given the limited temporary accommodating works and fewer third party requirements.

The 110kV Mullingar to Corduff overhead line that traverses the Proposed Development site at Carranstown Bog. Alternative locations for a proposed 110kV substation were investigated. The selected location requires the least amount of grid connecting infrastructure in the form mast requirements thereby reducing the potential for bid collision risk, is screen by adjacent vegetation and reduces the potential for impacts to unknown subsurface archaeology.

The site layout aims to avoid any environmentally sensitive areas. Where loss of habitat occurs in the site, this has been mitigated with the proposal of enhancement lands. The alternative to this approach is to encroach on the environmentally sensitive areas of the site and accept the potential environmental effects and risk associated with this. The best practice design and mitigation measures set out in this EIAR will contribute to reducing any risks and have been designed to break the pathway between the site and any identified environmental receptors. The alternative is to either not propose these measures or propose measures which are not best practice and effective and neither of these options is sustainable.

The final design is considered the optimal layout given it has the least potential for environmental effects.

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 full description of the proposed wind farm development, as per the public planning notices, is as follows:

i. The construction of 26 No. wind turbines and all associated hard-standing areas with the following parameters:
    a. A total blade tip height of 200m,
    b. Hub height of 115m, and
    c. Rotor diameter of 170m.
ii. 2 No. permanent Meteorological Anemometry Masts with a height of 115 metres and associated hardstanding area and removal of existing meteorological mast.
iii. 4 No. temporary construction compounds with temporary site offices and staff facilities, in the townlands of Bracklin and Grange More.
iv. 5 No. temporary security cabins at the main construction site entrances and access points around the site, in the townland of Killagh, Grange More and Coolronan.
v. 2 No. borrow pits located in the townlands of Grange More and Craddanstown and all works associated with the opening, gravel and spoil extraction, and decommissioning of the borrow pits.
vi. 1 No. permanent 110 kV electrical substation, which will be constructed in the townland of Grange More. The electrical substation will have 2 No. single storey control buildings, a 36

metre high telecom tower, associated electrical plant and equipment, a groundwater well and a wastewater holding tank.

vii. All associated underground electrical and communications cabling connecting the turbines and masts to the proposed electrical substation, including road crossings at R156 and a local road between Lisclogher and Bracklin Bogs, and all works associated with the connection of the proposed wind farm to the national electricity grid, which will comprise connecting into the existing Mullingar – Corduff 110 kV overhead line that traverses the site.

viii. Provision of new internal site access tracks with passing bays measuring a total length of c. 28km and provision/upgrade of existing/new pathways for amenity uses measuring a total length of c. 3.3km and associated drainage.

ix. Temporary accommodating works to existing public road infrastructure to facilitate delivery of abnormal loads at locations on the R156 and R161 in the townlands of Doolystown and Moyfeagher;

x. Accommodating works to widen existing site entrances off the R156 into Ballivor and Carranstown Bogs and reopen entrances at Lisclogher and Bracklin Bogs for use as construction site entrances and to facilitate delivery and movement of turbine components and construction materials; Entrances will be used for maintenance and amenity access during the operational period;

xi. Permanent vertical realignment of the R156 in the vicinity of the site entrance to achieve required sight lines.

xii. Construction of permanent site entrances off a local road into Lisclogher and Bracklin Bogs to facilitate a crossing point for turbine components, construction materials and operation/amenity access;

xiii. Provision of amenity access and amenity pathways using existing entrances off the R156 and local roads in the townlands of Bracklin, Coolronan, Clondalee More and Craddanstown;

xiv. 3 No. permanent amenity carparks in Ballivor Bog (50 no. car parking spaces), Carranstown (15 no. car parking spaces) and Bracklin Bog (15 no. car parking spaces) and the provision of bicycle rack facilities at each location.

xv. All associated site works and ancillary development including access roads, drainage and signage.

xvi. A 10-year planning permission and 30-year operational life of the wind farm from the date of commissioning of the entire wind farm.

The 26 no. proposed wind turbines will have a tip height of up to 200 metres. 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. The turbines will be multi-ply coated to protect against corrosion. 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 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.

Approximately 28 kilometres of internal access roads will need to be constructed to provide connective access to all turbines and ancillary infrastructure. The majority of these roads will be floated, therefore reducing the requirements for peat disturbance. These roads will form part of amenity loops and trials for public use during the operational phase. In addition to this, a further 3.3km of dedicated amenity rails will be construction/upgraded. including the upgrade 450m of existing access road.

A connection between the Proposed Development and the national electricity grid will be necessary to export electricity from the proposed wind farm. It is proposed to construct a 110kV electricity substation

in the northwest of Carranstown Bog to connect to the Mullingar to Corduff 110kV overhead line which traverses the Wind Farm Site. Two substation control buildings will be located within the substation compound. The wind farm control buildings 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 approximately 1.2 metres below the ground surface, along the sides of or underneath the internal roadways.

Two permanent anemometry masts are proposed as part of the Proposed Development. The anemometry masts will be equipped with wind monitoring equipment at various heights. The masts will be slender free standing structures up to 115 metres in height.

Four 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 732,000 m^3 of peat and spoil will be managed during the construction of the Proposed Development. This peat and spoil will be managed by means of placement/spreading along site the proposed infrastructure elements, where suitable. Excavated peat and spoil will also be used for reinstatement and landscaping works as close to the extraction point as possible or stored within the proposed onsite borrow pits. Approximately 717,291m^3 of stone is required for the construction of the Proposed Development. It is proposed to source stone from local, authorised quarries and/or from onsite borrow pits.

Two main entrances are proposed for the construction stage of the Proposed Development in order to transport turbine components, materials and equipment to the site. The entrance can be described as follows:

- Widening of existing site entrance off the R156 into Ballivor Bog in the townland of Grange More;
- Widening of existing site entrance off the R156 into Carranstown Bog in the townland of Grange More.

In addition to the above, in order to deliver turbine components into Lisclogher Bog via the main site entrance described above, an entrance will be constructed at Bracklin Bog onto a local road and an opposing entrance will be inserted into Lisclogher Bog. This will facilitate the direct travel of components from Bracklin Bog to Lisclogher Bog across the local road, thus minimising road and traffic impacts as the components will travel through Carranstown and Bracklin bogs rather than the local road network and cross the narrow road into Lisclogher Bog. This local road network will not be used to facilitate access for components to these bogs.

It is proposed that the large wind turbine components will be delivered to site via the M3, exiting at Junction 6 onto the R125 before turning northwest onto the R154 Trim Road. The delivery route enters Trim town before turning south onto the R161 for approximately 7.5km where it meets the R156. The delivery route continues west for approximately 11.1km along the R156 through Ballivor Village before reaching the proposed site entrances off the R156. All deliveries of turbine components to the site will only be by way of the proposed transport route.

On the R156 in between the proposed component entrances to Ballivor and Carranstown Bogs, existing visibility is currently impacted by a trough and rise in the road. As part of the wind farm construction works, it is proposed to permanently lower a section of the R156 to remove the current visual impediment and enhance the safety of this road. This proposed work will be undertaken prior to any construction phase works and will be retained for the operational phase and beyond.

The drainage design for the Proposed Development has 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 were originally 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 24 months from starting onsite to the full commissioning of the wind farm. The construction phase can be broken down into three main overlapping 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 fully. The onsite substation will remain in place as it will be under the ownership of the ESB/EirGrid.

Population and Human Health

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 is located 5 km south-southeast of Delvin in County Westmeath, 4km east of Raharney in County Westmeath and 3.5km west of Ballivor Village, in County Meath. 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 site of the Proposed Development lies within 8 No. District Electoral Divisions (DEDs): Ballyhealy, Copperalley, Cloghbrack, Killaconnigan, Killyon, Riverdale, Ballynaskeagh and Bracklin which is referred to as the population Study Area for this section of the EIAR. The Study Area has a population of 4,841 persons as of 2016 and comprises a total land area of 16,074km^2 (Source: CSO Census of the Population 2016). The closest dwelling to the proposed Ballivor Wind Farm is located approximately 815m from the nearest proposed turbine (T17), i.e., greater than the recommended setback distance (i.e., 800m, 4 times the tip height of 200m), as per the Draft Revised Wind Energy Development Guidelines

December 2019 which has more onerous setback requirements in comparison to the current adopted 2006 Wind Energy Guidelines.

Approximately 100-120 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 direct impact.

Commercial rates from the wind farm will contribute significant funds to Meath and Westmeath County Councils to support the provision of public services within these counties. These services include road maintenance, fire services, environmental protection, street lighting, footpath maintenance, etc. along with other community and cultural support initiatives. This will have a long-term slight positive direct 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. An indoor phenomenon, it 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. The closest dwelling, currently unoccupied, is 815m from the nearest proposed turbine, with 217 dwellings located within 1.7km of the turbine locations. 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 30% was applied. Of the 217 No. residential properties modelled, the daily threshold of over 30 minutes shadow flicker may potentially be exceeded at 80 properties. The annual threshold of over 30 hours for shadow flicker is predicted to be exceeded at 12 properties once the regional sunshine average factor has been considered. However, this prediction does not consider wind direction or screening provided by intervening vegetation and topography. Therefore, in reality, shadow flicker events are likely lower than predicted.

Where daily shadow flicker exceedances have been predicted at buildings by the modelling software, a site visit will be undertaken firstly to determine the level of occurrence, existing screening and window orientation. The shadow flicker prediction data will be used to select dates on which a shadow flicker event could be observed at one or multiple affected properties. If the results determined that shadow flicker was present and exceeded thresholds, 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 1.7km study area. The same mitigation strategies also demonstrate that the Ballivor 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, noise emissions, air and water quality, traffic, tourism, residential amenity, and 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 significant residual negative effects on Population and Human Health within the Study Area.

Furthermore, it has been concluded that there will be a long-term significant positive impact on CO_2 emissions and energy targets with the implementation of the Proposed Development, which will have the potential to offset 6,035,010 tonnes and 8,717,237 tonnes of Carbon Dioxide (CO_2) (Against EU Fossil Fuel Comparator (FFC)), by supplying approximately 70,036 to 101,163 Irish households with electricity per year which otherwise would rely on fossil fuel sources.

In summary, there will be no negative significant effects on population and human health during the construction, operation and decommissioning phases of the Proposed Development. There will be a long-term significant positive impact on air quality through the offsetting of CO_2 emissions.

Biodiversity

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

The habitats within the Proposed Development site were the subject of a detailed survey and assessment by Bord na Móna ecologists in 2011 and 2012, with follow up visits undertaken in subsequent years. A detailed habitat map was produced of the entire landholding of the Proposed Development. Multidisciplinary walkover surveys, and dedicated botanical and faunal surveys, of the Proposed Development Site were undertaken on the 23rd April, 26th May, 4th June, 16th June, 20th July and 3rd September 2020, on the 26th and 27th May, the 8th and 15th July and 27th September 2021, on the 26th April and 26th September 2022 and on the 16th February 2023 by MKO ecologists. During the surveys undertaken by MKO ecologists, the habitats recorded and mapped by Bord na Mona were also ground-truthed. All habitats were classified in accordance with Fossitt (2000). A comprehensive walkover of the entire site was completed.

The lands within the Wind Farm Site Boundary comprise 4 large cutover raised bogs, Lisclogher East and Bracklin Bog to the north and, Carranstown Bog and Ballivor Bog to the south. Large areas of the site, i.e. Lisclogher Bog and large parts of Bracklin and Ballivor Bogs, have been out of commercial peat production by Bord na Móna for a significant period of time and thus vegetation, dominated primarily by birch scrub and woodland, common cottongrass and ling heather, has regenerated over much of these areas. Other areas, i.e. Carranstown Bog and sections of Ballivor were undergoing peat extraction until relatively recently and are characterised by large areas of bare peat. Peat production ceased entirely in June 2020, in the last few areas of extraction where it had been ongoing. Small areas of uncut remnant raised bog are also present at a number of locations throughout the Proposed Development Site, mostly at the peripheries. These are predominantly outside the footprint of the Proposed Development.

The construction of the proposed windfarm will result in the small-scale loss of a number of habitats of local importance (higher value). This predominantly involves the loss of cutover bog habitats (approximately 32.8ha as a result of both temporary and permanent elements of the Proposed Development) characterised by bare peat, revegetating dry heath and pioneer poor fen communities, as well as smaller areas of revegetating birch scrub and dry bog woodland. The loss of approximately 32.8 hectares of bare peat and revegetated cutover bog habitats represents only a small fraction (1.9%) of the total area of this habitat within the Proposed Development Site. While the Proposed Development has been designed to avoid the vast majority of the uncut remnant raised bog within the Proposed Development Site, there will also be some loss of a small area (1.03ha in total) of highly degraded uncut remnant raised bog within the site. The loss represents a very small fraction (0.3%) of the total area of this habitat within the site and will occur across 6 separate fragments of degraded remnants of the habitat. In addition to the above there will also be some loss of a small area (0.28ha) of oak-ash-hazel woodland as well as sections of hedgerow habitat with scattered trees. Note the footprint of the permanent wind farm infrastructure is 32.4ha.

A Habitat Management and Enhancement Plan has been prepared for the Proposed Development which allows for the re-wetting and enhancement of approximately 12ha of drained, remnant uncut raised bog at the northern extent of Bracklin Bog through drain blocking. The plan also allows for the planting of approximately 6.5ha of native woodland within the Proposed Development Site which will fully address any loss of woodland to the Proposed Development. Given the small area of habitat to be lost to the Proposed Development in comparison to the total area of habitat present within the site and following the implementation of the Habitat Management and Enhancement Plan, no significant effects on any habitats at any geographical scale are anticipated. Furthermore, the implementation of the Habitat Management and Enhancement Plan has the potential to result in a positive impact on the area of remnant peatland habitat within which the proposed re-wetting measures are proposed. The implementation of the Plan will also result in an overall increase in the area of woodland within the Proposed Development Site.

No potential for significant negative effects on faunal species as a result of the Proposed Development were identified. The watercourses within the Proposed Development Site do not provide optimal fisheries habitat or optimal habitat for otter. No otter resting or breeding sites were identified within the Proposed Development Site and there will be no instream works within any natural watercourses within the Proposed Development Site. In addition, detailed fisheries and bat assessments have been undertaken as part of the detailed baseline assessment, detailed results of which are provided in technical appendices to this EIAR. The site provides suitable habitat for badger and a badger sett was recorded in close proximity to the Proposed Development infrastructure at Carranstown Bog. A range of best practice measures are included within this Chapter to ensure that there will be no significant effects on badger as a result of the Proposed Development. Evidence of fox, deer, pine marten, Irish hare and pygmy shrew were also recorded within the boundaries of the Proposed Development Site. No evidence of significant populations of these species 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 for the either construction or operational phases of the Proposed Development and therefore no significant effects on rivers and streams and sensitive aquatic faunal species.

Provided that the Proposed Development is constructed and operated in accordance with the design, and best practice and mitigation measures described within this application, significant impacts on biodiversity are not anticipated.

Ornithology

This chapter assesses the likely significant effects that the Application Site may have on bird species. Firstly, a brief description of the Application Site 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 Application Site on bird species. The survey data is presented in full in the Environmental Impact Assessment Report (EIAR) appendices with a summary of the information presented within this chapter. An analysis of the results is then provided, which discusses the ecological significance of the birds recorded within the study area. The potential effects of the Application Site 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 Application Site along with a comprehensive knowledge of bird activity within the study area. The identification of Key Ornithological Receptors (KORs) and the assessment of effects follow a precautionary approach.

The potential for effects on designated sites is fully described in the Natura Impact Statement (NIS) that accompanies this application. The NIS concluded that where the potential for any adverse effect on any

European Site has been identified, the pathway by which any such effect may occur has been robustly blocked through the use of avoidance, appropriate design and mitigation measures as set out within this report and its appendices. The measures ensure that the construction, operation and decommissioning of the Application Site will not adversely affect the integrity of any European sites.

Based on the detailed assessment, it is considered that the potential effects of the Application Site 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). With the exception of kestrel, for which short-term moderate negative effect (EPA, 2022) and low effect significance (Percival, 2003) were predicted. However, as detailed in Section 7.7, of Chapter 7 of this EIAR, a robust mitigation plan is proposed to reduce the magnitude of the impact from short-term moderate negative effect (EPA, 2022) and low effect significance (Percival, 2003) to long-term slight negative effect (EPA, 2022) and low effect significance (Percival, 2003).

The implementation of the prescribed mitigation measures will render any potential effects on avian receptors to low significance. In conclusion, no significant effects as a result of the Application Site 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 proposed site consists predominantly of cutover bog comprising of bare peat fields separated by field drains. The existing topography of the proposed site is relatively flat, ranging from approximately 69 to 84 metres above Ordnance Datum (mOD). As a result of historic peat extraction activities and associated drainage works the land and topography of the proposed site has been significantly modified. Peat extraction activities ceased at the proposed site in the summer of 2020 and the former peat production areas are not available for revegetation,

Based on the peat depth information for the proposed site, the peat varied in depth from 0.4 to 5.7m with an average of 1.93m. The peat thickness at proposed turbine locations ranges from 0.7 to >5m with an average of 2.4m. Site data indicates that 70% of the proposed turbine locations have a peat depth ≤3m, with only 2 no. proposed turbine locations having a peat depth in excess of 5m. The deeper peat areas have generally been avoided in the Proposed Development layout. The peat deposits at the proposed site are underlain by glacial tills comprising of clay, silts, sands and occasional gravels. The glacial till deposits are underlain by limestone bedrock.

The Proposed Development will typically involve removal of peat and subsoils (spoil) for access roads, internal road network, internal cable network, hardstanding emplacement, turbine foundations, substation, crane hardstands, compounds and met mast foundations.

Estimated volumes of peat and spoil to be excavated are in the region of 732,000m^3. Excavated peat and spoil will also be used for reinstatement and landscaping works as close to the extraction point as possible or stored within the proposed onsite borrow pits. The handling and storage of peat and spoil will be done in accordance with the Peat and Spoil Management Plan which is included as Appendix 4-2 to the EIAR.

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

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

The Proposed Development has a very small development footprint when compared to the overall area of the proposed site and the wider Ballivor Bog Group. Therefore no significant effects on land will occur during the construction, operation or decommissioning phases of the Proposed Development.

The peat bog at the proposed site is already degraded by the historical harvesting and drainage. For this reason, and with the implementation of the mitigation measures detailed in this EIAR and the best practice measures detailed in the Peat and Spoil Management Plan, no significant effects on peat and soils will occur during the construction, operation or decommissioning phases of the Proposed Development.

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

An assessment of potential cumulative effects associated with the Proposed Development and other developments on land, soils and geology has been completed. The Land, Soils and Geology Assessment confirms there will be no significant cumulative effects on land, soil and geology as a result of the Proposed Development. The assessment found that the cumulative effect with the bogs rehabilitation plans will result in an overall positive effect on the local land, soils and geological environment due to the small footprint of the development.

Hydrology and Hydrogeology

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

The surface of the proposed site is drained by a network of drains that are typically spaced every 15 to 20m. Larger arterial drains connect the smaller field drains and gently slope towards perimeter silt ponds and surface water outfalls. Surface water outflows from the site discharge to small streams and drains located in the lands surrounding the Ballivor Bog Group. All outfalls are drained by gravity with no pumping locations situated within the proposed site.

Regionally, the proposed site is located in the River Boyne surface water catchment. The proposed site drains to the west towards the Deel River, to the east towards the Stonyford River and to the south towards the River Boyne via the Ballivor River. All surface water drainage pathways from the proposed site eventually discharge to the River Boyne.

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

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

Surface water drainage measures, pollution control and other preventative measures have been incorporated into the project design to minimise significant impacts on water quality and downstream designated sites. A self-imposed 50m stream and lake buffer was used during the design of the Proposed Development, thereby avoiding sensitive hydrological features. The surface water drainage plan will be the principal means of significantly reducing sediment runoff arising from construction activities and to control runoff rates. The key surface water control measure is that there will be no direct discharge of wind farm runoff into local watercourses or into the existing bog drainage network. This will be achieved by avoidance methods (i.e. stream buffers) and design methods (i.e. surface water drainage plan). Preventative measures also include fuel and concrete management and a waste management plan which will be incorporated into the Construction and Environmental Management Plan.

No significant impacts to surface water (quality and flows) and groundwater (quality and quantity, and any local groundwater wells) will occur as a result of the Proposed Development provided the proposed mitigation measures are implemented. This EIAR presents proven and effective mitigation measures to mitigate the release of sediment which will reduce the concentration of suspended solids to acceptable levels. The storage and handling of hydrocarbons/chemicals will be carried out using best practice methods which will ensure the protection of surface and groundwater quality. The Proposed Development drainage system will be designed to slow surface water runoff from the proposed site by providing greater attenuation. This will ensure that the Proposed Development does not alter downstream surface water flows and will not contribute to downstream flooding.

A hydrological assessment of potential impacts on local designated sites was undertaken. The River Boyne and River Blackwater SAC and SPA is considered to be hydrologically connected to the proposed site, as the Deel, Stonyford and Boyne rivers in the vicinity and downstream of the proposed site are designated for conservation. Following implementation of the appropriate mitigation measures as outlined in the EIAR no significant impacts on this designated site will occur as a result of the Proposed Development.

A Water Framework Directive (WFD) Compliance Assessment has been completed for all waterbodies (surface water and groundwater bodies) with the potential to be impacted by the Proposed Development. With the implementation of the mitigation measures detailed in Chapters 8 and 9 of the EIAR there will be no change in the WFD status of the underlying groundwater body or downstream surface waterbodies as a result of the Proposed Development. The Proposed Development has been found to be fully compliant with the WFD and will not prevent any waterbody from achieving its WFD objectives.

An assessment of potential cumulative effects associated with the Proposed Development and other developments on the hydrological and hydrogeological environment has been completed. With the implementation of the mitigation measures detailed in Chapters 8 and 9 of the EIAR, the cumulative assessment found that there will be no significant effects on the hydrological and hydrogeological environments. The assessment found that the cumulative effect with the bogs rehabilitation plans will result in an overall positive effect as the rehabilitation plans will improve surface water quality and attenuation within the proposed site.

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
- Zone B: Cork
- Zone C: Other cities and large towns including Limerick, Galway, Mullingar
- Zone D: Rural Ireland, i.e., the remainder of the State excluding Zones A, B and C.

These zones were defined to meet the criteria for air quality monitoring, assessment and management described in the Cafe Directive 2008/50/EC, and Daughter Directives. The Proposed Development site lies within Zone D which represents rural areas located away from large population centres. The most recent report on air quality in Ireland, 'Air Quality in Ireland 2021' was published by the EPA in 2022. The EPA reports provide SO_2, PM_{10}, NO_2 and O_3 concentrations for areas in Zone D. The report concludes that the air quality of Zone D areas with respect to SO_2, PM_{10}, NO_2 and O_3 concentrations is within acceptable limits. Peat extraction ceased at the Ballivor Bog Group in June 2020. From 2000 to 2020 dust emissions were measured during peat extraction activities and the results submitted to the EPA in Annual Environment Reports. On no occasion during the peat extraction activities were dust emission limits of 350 mg/m^2/day exceeded. Therefore it is considered that since extraction ceased, dust emissions at the site have reduced considerably and do not exceeded daily thresholds.

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.

During the construction phase, there will be potential impacts from dust and CO2 emissions due to the presence of machinery on site, increased traffic and peat disturbance. A Construction and Environmental Management Plan (CEMP) will be in place throughout the construction phase (see Appendix 4-3 of the EIAR) and includes dust and CO_2 suppression measures. It is considered that there will be no significant effects on air quality during the construction phase. The Proposed Development will have the potential to offset approximately 6,035,010 tonnes and 8,717,237 tonnes of Carbon Dioxide (CO_2) per annum (Against EU FFC), due to the provision of renewable energy in the range of approximately 70,036 to 101,163 Irish households with electricity per year. This will be a long-term Moderate Positive indirect effect on Air Quality.

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 thought to increase the frequency of extreme weather conditions such as storms, floods and droughts. In addition, warmer weather trends can place pressure on animals and plants that cannot adapt to a rapidly changing environment. Moving away from our reliance on coal, oil and other fossil fuel-driven power plants is essential to reduce emissions of greenhouse gases and combat climate change.

In June 2022, the Environment Protection Agency released 'Ireland's Greenhouse Gas Emissions Projections 2020-2040'. The EPA projections show that currently implemented measures (With Existing Measures) will achieve a reduction of 5% on 2005 levels by 2030, significantly short of the 30% reduction

target. If measures in the higher ambition (With Additional Measures) scenario are implemented, the 30% reduction target by 2030 can be achieved. In the With Additional Measures scenario, it is assumed that by 2030 renewable energy generation increases to approximately 80% of electricity consumption. However, increased coal use from 2021 and growing energy demand, including from data centres, threaten to negatively impact preferred scenario.

The Proposed Development will have an export capacity of approximately 117MW to 169MW and therefore will help contribute towards this target. As well as this, it will provide much needed grid infrastructure and the capacity to offset 6,035,010 tonnes and 8,717,237 tonnes of Carbon Dioxide (CO_2) (Against EU FFC), thereby reducing the Greenhouse Gas effect and improving air quality as we transition to cleaner energy industries. Please see Chapter 10 for details on Carbon offset calculations.

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.

Bord na Móna developed a methodology based on their extensive experience for calculating carbon losses and savings from proposed wind farm development. The methodology was informed by the Scottish Governments Carbon Calculator and other relevant information sources such as:

- Multiyear greenhouse gas balances at a rewetted temperate peatland. (Wilson et al., 2016;
- Greenhouse gas Emission Factors. (Wilson et al., 2016);
- Derivation of GHG emission factors for peatlands managed for extraction in the ROI and the UK. (Wilson et al. 2015); and
- The Effect of Management Strategies on Greenhouse Gas Balances in Industrial Cutaway Peatlands in Ireland (The CARBAL Report) (Wilson, D. and Farrell, E.P., 2007).
- Wilson et al (2013) Carbon Emissions and Removals from Irish Peatlands: Present Trends and Future Mitigation Measures Irish Geography 2013 Vol. 46 Nos. 1-2, 1-23.

This 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 methodology reflects the specific nature of the cutaway peat lands upon which the project is proposed to be located. 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.

Based on the Bord na Móna model calculations as presented above, 384,030 tonnes of CO_2 will be lost to the atmosphere due to changes in the peat environment, changes in the cycling of mid-merit gas-fired generation units and due to the construction, operation and decommissioning of the Proposed Development. This represents a small fraction of the estimated 6,035,010 tonnes and 8,717,237 tonnes of Carbon Dioxide (CO_2) (Against EU FFC), that will be offset by the operational phase of the Ballivor Wind Farm. The volume of CO_2 that will be lost to the atmosphere during the construction phase will be offset by the Proposed Development between 1.17 and 2.37 years of operation, depending on the fuel source to which it is compared.

In summary, the 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 has been commissioned to conduct an assessment into the likely environmental noise and vibration impacts of the proposed Ballivor Wind Farm development.

The background noise environment in the absence of existing operational wind farm developments has been established through noise monitoring surveys undertaken at eight 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). The results of the background noise survey have been used to derived appropriate noise criteria for the development in line with the guidance contained in *'Wind Energy Development Guidelines for Planning Authorities 2006'.*

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

The assessment of construction and decommissioning noise and vibration and has been conducted in accordance with 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, it is not expected that there will be any significant noise and vibration impacts associated with the construction phase and the likely noise from construction activity at the nearest NSLs is expected to be within recommended threshold values. The associated construction noise and vibration impacts are not expected to cause any significant effects.

Based on detailed information on the site layout, the likely turbine noise emissions and turbine hub height for the Proposed Development, a series of cumulative turbine noise prediction models were prepared. The predicted turbine noise levels have been calculated in accordance with the IOA GPG recommendations. The assessment has confirmed that the residual turbine noise levels associated with the Proposed Development, and the permitted Bracklyn wind energy development will be within the best practice noise criteria curves recommended in Irish guidance document *'Wind Energy Development Guidelines for Planning Authorities 2006.* Therefore, it is not considered that a significant effect is associated with the Proposed Development.

No significant vibration effects are associated with the operation of the Proposed Development.

In summary, the noise and vibration impact of the Proposed Development is not significant considering best practice guidance for wind turbine developments.

Archaeological, Architectural and Cultural Heritage

This chapter comprises assess the potential impact of the Proposed Development on the Cultural Heritage resource. Cultural heritage includes archaeology, architectural heritage and other detailed 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 proposed infrastructure within the wind farm site boundary.

No direct Effects to Trim Castle will occur. No effects on setting from the grounds of Trim castle will occur. The potential effects on setting of Trim Castle when viewed from the upper floor are Slight/Moderate. Cumulative effects will occur and will be moderate when considering Ballivor, Yellow River, Milltown Pass and Bracklyn together).

Effects on the setting of Frewin Hill were also assessed. The theoretical viewshed analysis show that all turbines have some potential degree of visibility from the monument (requiring clear weather conditions). The Photomontage (Appendix 13-4) also shows that all turbines will be visible at a distance at various turbine heights. The potential impact is considered to be Slight given the separation distance between the monument and the proposed turbines. Cumulative effects may occur (effects may increase from Slight when considering Ballivor turbine alone to Slight/Moderate (when considering Ballivor and Bracklyn together).

National Monuments within 10km of the nearest proposed turbine were assessed. The effects on setting will be slight (from viewshed analysis and ZTV analysis).

No recorded monuments are located within the Wind Farm Site Boundary. No direct impacts to this resource will take place, therefore. Indirect effects on sites and monuments and within 5km of the nearest proposed turbine were assessed. Effects are considered to be slight-Moderate since the ZTV shows that 21-26 turbines may be visible from all locations where the SMRs are located. This is a worst case scenario however since natural screening is not taken into consideration in this ZTV model and in reality natural screening may reduce the effects on setting considerably. Cumulative effects may occur and the effect on setting may increase from Slight/Moderate when considering Ballivor turbine alone to moderate when considering both Ballivor and Bracklyn turbines (located adjacent to the Proposed Development).

One structure listed in the Record of Protected Structures is located within the EIAR boundary (NIAH Reg. No. 15402102 and RPS 021-008 Permanent narrow gauge Bord na Mona railway line). The proposed roads will interact the rails at 7 locations. Since the roads will be floated, there is no requirement to remove any of the tracks and in this regard no direct effects will occur. Furthermore, no level crossings will be negatively impacted. An extensive railway network will remain on the site however for future generations. Mitigation measures to include the provision of information signage will be required and implemented and will be erected at various locations along the amenity trails. This will result in a positive impact.

Two structures listed in the Record of Protected Structures are located along the Haul Route including Scarriff Bridge NIAH Reg number 14403601 RPS 91254 and Ballivor Water Pump (NIAH Reg 14327002 and RPS ID 91156).

The haul route extends through Ballivor at the western end which contains a number of NIAH structures which are also listed in the RPS. The water pump at the roadside may be deemed to be more at risk from damage from the movement of large abnormal loads and a potential direct negative effect to the structure is possible although is considered to be slight. The structure will be fenced off temporarily with high-visibility fencing during the movement of the abnormal loads through Ballivor.

The sub-surface archaeological potential of the bog is considered to be high taking into consideration the RMPs in the surrounding landscape, the presence of a bog-body (Clonycavan Man) discovered in the peat sorting plant (excavated by machines on a peat-field) as well as the numerous stray finds detected within the Wind Farm Site Boundary (now housed in the National Museum of Ireland). The excavation of peat during all elements of the Proposed Development has the potential to impact on any new sites, if present. All elements of the Proposed Development include turbine and meteorological mast bases, hardstands, roads, cable trenches, amenity car park, amenity trails, construction compounds, substation site, grid connection loop-ins, angle towers, borrow pits, security cabins and gates, drainage, junction accommodation areas along the haul route and any other peat extraction activities. Mitigation measures will include construction stage monitoring. Should new sites, features or artefacts be present within the site (currently not visible on the surface) the impact is likely to be significant negative and permanent (i.e. the excavation by machinery would permanently remove the sites resulting in a significant negative impact). The sites/features, if detected, during monitoring will be preserved by record (archaeologically excavated) or preserved in-situ (avoidance) and therefore a full record made of same. In this regard, the potential impact after the mitigation measures is likely to be Slight. In terms of cumulative effects, since all projects have been assessed from a cultural heritage perspective through the EIAR process, all potential negative effects are deemed to have been dealt with through the use of effective mitigation measures and planning conditions issued through the Planning Authorities. If the mitigation measures prescribed in this EIAR are implemented then cumulative direct effects to unknown sub-surface archaeology will not occur, regardless of the other projects within 20km of the Proposed Development.

A review of the historic OS mapping and the walkover survey has shown that a derelict ruined structure ('Tonduff') is located within an overgrown section of the bog. This is a possible famine settlement and is shown within Bracklin Bog on both the 1st Edition 6 inch map and the 25 inch 2nd Edition. The remains of the structure will be preserved in situ and the impacts are considered to be Imperceptible. Licensed archaeological monitoring of the proposed road to the west will be undertaken during construction and in this regard preventing any accidental damage to the structure.

Landscape and Visual

This chapter of the Environmental Impact Assessment Report (EIAR) assesses the likely significant landscape and visual impacts arising as a result of the Proposed Development. Although all elements of the Proposed Development are assessed, the Chapter focusses upon the proposed turbines, as they are deemed to be the essential aspects of the proposal under assessment from a landscape and visual perspective. The Chapter describes the baseline landscape and assesses the direct effects on the landscape of the Wind Farm Site, as well as effects on landscape character and the impact on sensitive landscape receptors and Landscape Character Areas (LCAs). Visibility of the proposed turbines was assessed from receptors within a study area extending 25km (and 26.1km for the Hill of Tara) from the proposed turbines; and visual effects were determined from information gathered during multiple site visits as well as other tools such as ZTV mapping and photomontages.

The Proposed Development Site is located in a flat lowland landscape with an expansive network of open peatlands located at the Westmeath-Meath County boundary. The character of these peatlands forming the Proposed Development Site is now strongly influenced by the industrial peat extraction practices historically conducted at the site. The bogs of the Proposed Development Site include: Ballivor Bog, Carranstown Bog, Bracklin Bog and Lisclogher Bog. Due to extensive peat harvesting operations in the 20th Century, the Proposed Development Site has been degraded and now presents as a cutover peatland landscape. Selection of the Wind Farm Site considered landscape and visual designations in the Westmeath and Meath County Development Plan(s). 16 of the proposed turbines are sited within Westmeath Landscape Character Area 3 (River Deel Lowlands), this LCA is deemed to be 'Low' sensitivity as there are no High Amenity Areas located within this LCA and does not comprise any unique landscape features of county or national interest. The LCA was designated as an area with 'Low' capacity for wind energy, as are all other LCAs in Co. Westmeath. The remaining 10 proposed turbines are located within Meath LCA 15 (South-west Lowlands), this LCA was designated to have 'Medium'

potential for wind energy development. In terms of location, spatial extent, spacing and layout, the siting and design of the Proposed Development adheres to the guidance for the siting of wind farms in Flat Peatland Landscape Types, as set out in the Guidelines for Planning Authorities (DoEHLG, 2006).

On-site visibility appraisals, ZTV mapping, a Route Screening Analysis and assessment viewpoint locations determined that visibility of the proposed turbines will be very limited from locations beyond 5 km from the Wind Farm Site. Siting of the proposed turbines at low base elevation in a flat landscape with highly vegetated working fields surrounding the site, largely restricts visual exposure in the wider landscape. Visibility of the proposed turbines beyond the immediate landscape setting of the Proposed Development Site is limited to localised areas of high elevation where open views across the flat and highly vegetated landscape are available from elevated vantage points, which is in general not a common occurrence in the LVIA Study Area.

The landscape value of the Wind Farm Site is deemed to be of 'Low' value and the sensitivity of the landscape to wind farm development is deemed to be 'Medium'. The introduction of vertical man-made structures and ancillary infrastructure will substantially alter the landscape comprising the proposed infrastructure footprint at the Wind Farm Site. In terms of landscape character, the only LCAs to experience 'Moderate' landscape effects will be Westmeath LCA 3 and Meath LCA 15 in which the proposed site is located. These LCAs will experience direct effects on landscape character as a result of the project. Any other effects on other LCAs are indirect, as the Proposed Development will be visible from within these LCAs but located outside of them. The site is not located within or close to any designated High Amenity Areas within County Westmeath, Kildare or Offaly or any areas of High Landscape Sensitivity (Co. Meath) and has not had any significant effect on these areas.

Photomontages were used to assess the visual effects arising as a result of the Proposed Development from 19 No. viewpoint locations. The assessment concluded that no 'Profound' or 'Very Significant' effects occurred at any of the 19 viewpoints. Residual effects of 'Significant' occurred at one viewpoint location (VP03) as the turbines are in close proximity <1km. However, the Proposed Development adheres to the recommended 500m set back distance in the Guidelines (DoEHLG, 2006) and also the 4 times tip height set-back distance set out for residential visual amenity prescribed by the draft Guidelines (D0HPLG, 2019). No significant effects occurred from any other residencies or settlements within 5km of the site.

'Moderate' effects occurred at 3 of the 19 No. viewpoints. All other viewpoints were assessed as resulting in 'Slight' residual effects (12) or 'Not Significant' (3). Slieve na Calliagh and Loughcrew Megalithic Tomb, a designated Meath Scenic view, is located approximately 18.9km northwest of the closest turbine. Residual effects were deemed to be 'Moderate' as the proposed turbines read coherently in the expansive and long ranging landscape view. The Hill of Tara is located approximately 26.1km from the nearest proposed turbine and is a designated view within County Meath and was given 'Very High' sensitivity. Residual visual effect was deemed to be 'Slight' given the distance and character of the view, the turbines appear as two coherent clusters in the background of the expansive view.

The assessments determined that no significant cumulative landscape and visual effects will occur with any other existing or permitted or proposed wind farm development. The Proposed Development turbines will be seen in combination with turbines of the permitted Bracklyn wind farm. However, due to the proximity of the two developments, the Proposed Development turbines and the permitted Bracklyn turbines appear as one coherent wind farm development.

From a landscape and visual perspective, the Proposed Development turbines are considered appropriate with regards to the scale and layout from sensitive visual receptors in the study area. Although the spatial extent is increased with the addition of the Proposed Development turbines (as outlined in Appendix 13-3 *Photomontages Assessment Tables*) from several viewpoints, the visual separation between permitted and proposed turbines and the difference in scale is considered Low-Medium visual effects respectfully.

As shown in the Photomontage Assessment Tables (Appendix 13-3) and the Photomontage Booklet (Appendix 13-4)the turbine locations, spacing and heights have been appropriately selected for the Ballivor site. This appropriate siting and uniform spacing allow for the two turbine clusters to be read visually as one contiguous development in the landscape. The distance between the nearest turbines in the clusters is sufficient to ensure that the potential for cumulative visual effects for receptors located between the clusters is limited. The strategic siting ensures the wind farm will be viewed as a spatially coherent development, with minimal occurrence of visual confusion and overlapping, significantly mitigating the impact of likely visual effects.

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.

An abnormal size load delivery route is proposed as follows: The large wind turbine components will be delivered to site via the M3, exiting at Junction 6 onto the R125 before turning northwest onto the R154 Trim Road. The delivery route enters Trim town before turning south onto the R161 for approximately 7.5km where it meets the R156. The delivery route continues west for approximately 11.1km along the R156 through Ballivor Village before reaching the proposed site entrances off the R156. The proposed route is shown on Figure 4-28. All deliveries of turbine components to the site will only be by way of this proposed route.

There are 2 no. main site entrances proposed for the delivery of turbine components to the site. These two main entrances are located on the R156 and provide access and delivery of components into Ballivor Bog to the south, and into Carranstown Bog and on to the remaining bogs to the north. These existing entrances will be widened to facilitate the delivery of turbine components to the site. The entrance locations are depicted on Figure 4-1 and can be described as follows:

- Widening of existing site entrance off the R156 into Ballivor Bog in the townland of Grange More;
- Widening of existing site entrance off the R156 into Carranstown Bog in the townland of Grange More

In addition to the above, in order to deliver turbine components into Lisclogher Bog via the main site entrance described above, an entrance will be constructed at Bracklin Bog onto a local road and an opposing entrance will be inserted into Lisclogher Bog. These proposed entrance locations comprise former peat extraction entrances that were since closed up. This will facilitate the direct travel of components from Bracklin Bog to Lisclogher Bog across the local road, thus minimising road and traffic impacts as the components will travel through Carranstown and Bracklin bogs rather than the local road network and cross the narrow road into Lisclogher Bog. This local road network will not be used to facilitate access for components to these bogs nor construction materials or concrete deliveries.

The main entrances for the construction phase of the Proposed Development comprise the same component entrance into Carranstown Bog and a new dedicated construction entrance to the west of the component entrance into Ballivor Bog. Likewise, the crossing point between Bracklin and Lisclogher Bogs will also be used for construction materials and staff.

Following the construction phase of the Proposed Development, the widened entrances will be narrowed for the operational phase for amenity use and some will be reseeded and fenced. However they may need to be reopened during the lifetime of the development should replacement blades or other abnormal loads be required to access the site.

The delivery route for general HGV construction traffic may vary depending on the location of quarries and the suppliers used for stone and other materials required to construct the Proposed Development. It is intended to use quarries in the vicinity of the Proposed Development given the fact that trucks delivering stone comprise the majority of deliveries to from the site.

It is estimated that a maximum of 100-120 staff members will be employed on the site at any one time during the site preparation and groundworks stage of construction, reducing to a maximum of 80 staff at any one time during the turbine construction stage. If a worst case is assumed that all staff will travel to / from the site by car, at an average of 2 persons per car, then a total of 120 PCU movements (each trip is two way) will be added to the network during the groundworks stage of the development, reducing to 80 PCU trips during the turbine construction stage.

Once operational the site will also attract visitors for amenity purposes, with those travelling by car using the carparks provided via the access junctions off the R156 and off a local road at Bracklin Bog. The locations of the proposed carparks (repurposed construction compounds) are shown in Appendix 4-4, and include; the Bracklin Car Park (15 spaces), Carranstown Car Park (15 spaces) and Ballivor Car Park (50 spaces). Based on existing Bord na Móna sites it is forecast that on a typical day to 30 to 40 car trips will be generated by this use.

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 Construction and Environmental Management Plan (CEMP) which will be implemented during construction and these measures include the appointment of a traffic management coordinator, agreement of a delivery programme with Meath and Westmeath County Councils, 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.

A scoping exercise was undertaken to ascertain the presence of telecommunication links within the area of the Proposed Development and assess the potential for impacts on this communication infrastructure. Responses received concluded either no potential for interference or requested setbacks of turbines from respective links; with the latter being incorporated into the final design. A Telecommunications Impact Study (Appendix 14-2) was undertaken by AI Bridges for the Ballivor Bog Group within which the Application Site is located. The study concluded that the siting of the proposed Ballivor turbines will not impact on telecommunication links that traverse the Wind Farm Site. Consultation with the Irish Aviation Authority and Department of Défense indicates no impacts are anticipated on nearby aviation assets and that the Proposed Development is not located within any of the Air Corps assets as listed in the Tall Structures Position Paper.

Utilities and Waste Management

There is no Gas Networks Ireland infrastructure or public water supply infrastructure located within or adjacent to the Wind Farm Site. The 110kV Mullingar to Corduff overhead 110kV transmission line traverses the site in an east to west orientation at Carranstown Bog. There are no EPA-licensed or local authority-authorised waste facilities or activities located within the Wind Farm Site Boundary. All waste materials will be disposed of at licenced facilities if they cannot be reused or recycled. During the operational phase, waste emissions will be limited to a wastewater tank at the substation will be emptied when required.

Mitigation measures as detailed in Chapter 14 regarding working near grid infrastructure will be adhered to during the construction and decommissioning phase of the Proposed Development. In addition, a CEMP will be in place throughout the construction phase (see Appendix 4-3 of the EIAR) to ensure continuous health and safety and best practise measures are in place at all times.

In summary, there will be no significant effects on telecommunications, aviation, utilities and waste management as a result of the Proposed Development. There will be a long-term slight positive residual effect on electricity supply during the operational phase due to the supply a 117MW to 169MW of electricity to the national grid, offsetting the use of fossil fuels within the electricity generating sector. The Proposed Development has the potential supply approximately 70,036 to 101,163 Irish households with clean electricity per year.

Vulnerability of the Project to Major Accidents and Natural Disasters

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

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

A desk-study has been completed to establish the baseline environment for which the proposed risk assessment is being carried out. This will influence both the likelihood and the impact of a major accident or natural disaster. Local and regional context has been established prior to undertaking the risk assessment to develop an understanding of the vulnerability and resilience of the area to emergency situations. Further detail on the baseline environment is provided in Section 15.3 of this EIAR.

The scenario with the highest risk score in terms of the occurrence of major accident and/or disaster was identified as 'Contamination' of the Proposed Development site and risk of 'Industrial Accident- Fire' during the construction, operation and decommissioning phases. The Proposed Development has been designed and built in accordance with the best practice measures set out in this EIAR and, as such, mitigation against the risk of major accidents and/or disasters is embedded through the design.

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

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 16 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.