

Non-Technical Summary

Laurclavagh Renewable
Energy Development, Co.
Galway EIAR





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1. NON-TECHNICAL SUMMARY

1.1 Introduction

This Environmental Impact Assessment Report (EIAR) has been prepared by MKO on behalf of Laurclavagh Ltd, who intends to apply to An Bord Pleanála for planning permission to construct a renewable energy development which will comprise of 8 no. wind turbines and associated infrastructure, in the townland of Laurclavagh and adjacent townlands, near Tuam, and a 110kV on-site substation and associated works, including underground 110kV cabling to connect to the national grid at Cloon 110kV substation, in the townland of Cloonascragh, Co. Galway.

For the purposes of this EIAR:

- The ‘Proposed Wind Farm’ relates to the 8 no. turbines and supporting infrastructure (detailed description provided in Chapter 4 of this EIAR), and it is the subject of this planning application under Section 37E of the Planning and Development Act 2000, as amended.
- The ‘Proposed Grid Connection’ relates to the on-site 110kV substation and temporary construction compound and underground cabling connection to the existing Cloon 110kV Substation. The Proposed Grid Connection will facilitate the connection of the Proposed Wind Farm to the national electricity grid and will be subject of a separate planning application under Section 182A of the Planning and Development Act 2000, as amended.
- The ‘Proposed Project’ for the purposes of this EIAR comprises the Proposed Wind Farm and the Proposed Grid Connection, all of which are located within the EIAR Study Boundary (the ‘Site’) measuring approximately 944 hectares

The Proposed Wind Farm will have a potential generating capacity of greater than 50 megawatts (MW) and requires the provision of 110 kV infrastructure which will form part of the national electricity transmission network, therefore, two separate planning applications are required.

This planning application is being submitted to An Bord Pleanála (ABP) seeking permission for the Proposed Wind Farm. The application meets the threshold for wind energy set out in the Seventh Schedule of the Planning and Development Act 2000, as amended (being ‘An installation for the harnessing of wind power for energy production (a wind farm) with more than 25 turbines or having a total output greater than 50 megawatts’) and is therefore being submitted directly to An Bord Pleanála as a Strategic Infrastructure Development (SID) in accordance with Section 37E of the Planning and Development Act 2000, as amended. This approach has been confirmed following consultations with the Board under the provisions of Section 37B of the Planning and Development Act 2000, as amended (case reference ABP-315851-23).

The planning application is accompanied by this EIAR and a Natura Impact Statement (NIS). The Proposed Grid Connection will not form part of this planning application; however it is assessed in this EIAR as a part of the Proposed Project.

Should the planning application submitted to ABP under Section 37E of the Planning and Development Act 2000, as amended, receive a successful grant of planning permission, a second planning application for the Proposed Grid Connection will be submitted to ABP in accordance with Section 182A of the Planning and Development Act 2000, as amended subject to receiving confirmation of this approach from ABP.

This EIAR complies with the EIA Directive 2011/92/EU as amended by Directive 2014/52/EU.

Applicant

The applicant for the Proposed Project, Laurclavagh Ltd, is an associated company of Enerco Energy Ltd., which is an Irish-owned, Cork based company with extensive experience in the design, construction and operation of wind energy developments throughout Ireland, with projects currently operating in or in construction in Counties Cork, Kerry, Limerick, Clare, Galway, Mayo and Donegal.

By Q1 2024, Enerco and its associated companies had over 875 Megawatts (MW) of wind generating capacity under construction or in commercial operation, with a further 400MW of projects at various stages in its portfolio to assist in meeting Ireland's renewable energy targets..

Brief Description of the Proposed Project

The full description of the Proposed Project is detailed in Chapter 4 of this EIA. The current planning application, relating to the Proposed Wind Farm, is being made to An Bord Pleanála under Section 37E of the Planning and Development Act, 2000, as amended.

The development description for the current planning application as appears in the public notices is as follows:

The proposed development will consist of the provision of the following:

- i. 8 no. wind turbines with an overall turbine tip height of 185 metres; a rotor blade diameter of 163 metres; and hub height of 103.5 metres, and associated foundations, hard-standing and assembly areas;*
- ii. A thirty-year operational life of the wind farm from the date of full commissioning of the wind farm and subsequent decommissioning;*
- iii. Underground electrical cabling (33kV) and communications cabling;*
- iv. A temporary construction compound;*
- v. A temporary security cabin;*
- vi. A meteorological mast with a height of 30 metres and associated foundation and hard-standing area;*
- vii. A new gated site entrance on the L61461;*
- viii. Junction accommodation works and a new temporary access road off the N83 to the L61461, to facilitate turbine delivery and construction access to the site;*
- ix. Upgrade of existing site tracks/ roads and provision of new site access roads, junctions and hardstand areas.*
- x. Upgrade of the existing L61461;*
- xi. Spoil Management;*
- xii. Site Drainage;*
- xiii. Tree and hedgerow removal;*
- xiv. Biodiversity Enhancement measures (including the planting of natural woodland, hedgerows and species rich grassland for new habitat);*
- xv. Operational stage site signage; and*
- xvi. All ancillary works and apparatus.*

The application is seeking a ten-year planning permission.

The Proposed Grid Connection, which will be subject to a separate planning application, includes for a 110kV on-site substation compound (2 no. control buildings with welfare facilities, all associated electrical plant and apparatus, security fencing, underground cabling, waste water holding tank, site drainage and all ancillary works), a temporary construction compound and approximately 14.3km of 110kV underground cabling connecting the proposed on-site substation to the existing Cloon 110kV substation, near Tuam, Co. Galway.

Current and future wind turbine generator technology will ensure that the wind turbine model, chosen for the Proposed Project, will have an operational lifespan greater than the 30-year operational life that is being sought as part of the planning application.

Modern wind turbine generators currently have a typical generating capacity in the 4 to 7 MW range, with the generating capacity continuing to evolve upwards as technology improvements are achieved by the turbine manufacturers. For the purposes of this EIAR it is assumed that the wind turbine model installed as part of the Proposed Project will have a generating capacity of 7MW. Therefore, on this basis, the proposed 8 no. wind turbines would have a combined generating capacity of 56MW. The actual turbine procured as part of a competitive tender process may have a generating capacity that is marginally lower or greater than the 7MW turbine described in the EIAR. Irrespective of the generating capacity of the actual turbine procured, the conclusions of the EIAR will not be materially affected.

Need for the Proposed Project

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

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

Economic Benefits

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

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

It is estimated that the Proposed Project has the potential to create up to 100 jobs during the construction phase and 2-3 jobs during operational and maintenance phases of the Proposed Project. During construction, additional indirect employment will be created in the region through the supply of services and materials to the renewable energy development. There will also be income generated by local employment from the purchase of local services i.e. travel, goods and lodgings. Further details on employment associated with the Proposed Project are presented in Section 5.9 of this EIAR.

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

Purpose and Scope of the EIAR

The purpose of this EIAR is to document the current state of the environment on and in the vicinity of the Site and to quantify the likely significant effects of the Proposed Project on the environment. The

compilation of this document serves to highlight any areas where mitigation measures may be necessary in order to protect the surrounding environment from the possibility of any negative impacts arising from the Proposed Project.

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

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

A Natura Impact Statement has also been prepared in line with the requirements of the Habitats Directive and this EIAR and the NIS will accompany the planning application to the Board for the Proposed Wind Farm under Section 37E of the Planning and Development Act 2000, as amended.

Background to the Proposed Project

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

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

The Proposed Wind Farm comprises the provision of 8 no. wind turbines with an overall tip height of 185 meters and an estimated installed generating capacity of 56MW and associated infrastructure. The need to decarbonise the economy and reduce emissions has always been imperative, however in recent years the urgency involved has become clearer to all stakeholders. The latest Climate Action Plan (CAP) published by the Government in December 2023 sets out the detail for taking action to deliver the decarbonisation required under the carbon budgets and sectorial emissions ceilings. Central to this is the set of measures set out to increase the proportion of renewable electricity to up to 80% by 2030 and a target of 9GW from onshore wind. The CAP places front and centre the facts that without urgent action, global warming is likely to be more than 2° C above pre-industrial levels, threatening the health and livelihoods of people across the globe. Urgency of action is also a key focus of the CAP. All sectors will have to further their efforts if the core and further measures are to be achieved.

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

Local Planning Policy

Galway County Development Plan 2022 – 2028

The site of the Proposed Wind Farm is located in the administrative area of Galway County Council. As such the Galway County Development Plan 2022 – 2028 (CDP) which was adopted by Elected Members of Galway County Council on the 9th of May 2022 and came into effect on the 20th of June 2022 is the relevant County Development Plan, which provides the planning framework within which the planning application is assessed.

Local Authority Renewable Energy Strategy

The initial site selection process for the Proposed Wind Farm began in 2020. At this time, the relevant local wind energy policy document was the County Galway Wind Energy Strategy 2015 – 2021 (WES) and therefore the Proposed Wind Farm site was selected with consideration to these policies. The Proposed Wind Farm site was classified as “Open to Consideration” for wind energy development under the WES.

When the Galway County Development Plan 2022 – 2028 was adopted, the Proposed Wind Farm site was classified as “Generally to be Discouraged”. This classification was given under the County Galway's Local Authority Renewable Energy Strategy (LARES) which is included as Appendix 1 of the CDP.

This classification is defined as follows in the LARES:

‘Areas where Wind Energy development is unlikely to be favourably considered on account of potential to adversely effect protected landscape, water, ecological resources and residential amenity.’

The associated LARES Policy Objective associated with the ‘Generally to be Discouraged’ wind energy zoning classification is as follows:

‘Wind energy development proposals in areas that are identified as ‘Generally to be Discouraged’ for wind energy development will be considered in accordance with the LARES and the proper planning and sustainable development of the area.’

Whilst the modification of the wind energy classification was acknowledged, the decision was made to advance with the Proposed Wind Farm through the planning process. This decision was based on detailed site surveys and a comprehensive constraints analysis concluding in the site retaining its suitability for wind energy development.

It should be noted that the wind energy classification in the LARES does not restrict wind turbines within the “Generally to be Discouraged” but rather, they are assessed on the principles of proper planning and sustainable development, in accordance with the LARES. Section 6.4 of the Planning Report, included as part of this EIAR and Planning Application demonstrates the Proposed Wind Farm’s compliance with the relevant policies of the CDP and the LARES.

Wind Energy Development Guidelines

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

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

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

The Department of Housing, Planning and Local Government published the Draft Revised Wind Energy Development Guidelines (draft Guidelines) in December 2019 and they remain in draft at the time of writing. The Draft Guidelines note that potential impacts of wind energy development proposals on the landscape, including the natural and built environment, must be considered along with the legitimate concerns of local communities. The design of the Proposed Wind Farm has been designed in accordance with the Guidelines and has also been developed with the provisions of the Draft

Guidelines in mind (for example in relation to 4 times turbine tip height set back distance from sensitive receptors).

Planning History

The planning history of the Proposed Wind Farm site is outlined in Section 2.5 of this EIAR. A planning search was carried out through the national planning application database and An Bord Pleanála's online planning portal in February 2024 for relevant planning applications lodged since 2014 within the planning application boundary of the Proposed Wind Farm. There have been 2 no. applications made within the Proposed Wind Farm planning application site boundary. These applications comprise of small scale permissions relating to one off rural dwellings and agriculture.

Scoping and Consultation

Section 2.6 presents detail of the EIA Scoping undertaken with regards the Proposed Project. A scoping report, providing details of the Proposed Project, was prepared by MKO, and circulated in May 2023. MKO requested the comments of the relevant personnel/bodies in their respective capacities as consultees with regards to the EIAR process. As part of the constraints mapping process, which is detailed in Chapter 3 of this EIAR, telecommunications operators were contacted in February 2022 in order to determine the presence of telecommunications links either transversing the site or in close proximity to the Proposed Wind Farm site. Chapter 2 includes a list of scoping consultees and responses received, with full copies of all scoping responses received set out in Appendix 2-2 of the EIAR.

Community engagement has been undertaken by the Applicant, details of which can be found in Appendix 2-1 of this EIAR. In summary, the report was prepared to record the consultation carried out with the local community in respect of the Proposed Project. The applicant has carried out consultation in relation to the Proposed Project with local residents surrounding the proposed Wind Farm site and interested parties in the wider community. The objective of the consultations was to ensure that the views and concerns of all were considered as part of the Proposed Project design and EIA process.

The Proposed Project has the potential to have significant benefits for the local economy, by means of job creation, landowner payments and commercial rate payments. An important part of any renewable energy development, which Laurclavagh Ltd. has been at the forefront of developing, is its Community Benefit Package as discussed in detail in Appendix 2-1.

Section 2.7 of this EIAR includes details of the pre-planning meetings undertaken prior to the planning application being lodged, including engagement with An Bord Pleanála under the provisions of Section 37B (and 182E) of the Planning and Development Act 2000, as amended.

Cumulative Impact Assessment

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

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

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

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

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

Geographical boundaries within which there may be potential for cumulative impacts to arise, relative to each individual EIAR topic (i.e. each chapter) is set out within the Chapter. To gather a comprehensive view of cumulative impacts within the cumulative study areas for each discipline and to inform the EIA process being undertaken by the competent authority, each relevant chapter within the EIAR addresses the potential for cumulative effects where appropriate and within the context of their identified cumulative study area. A long list of all plans and/or projects considered by each of the different disciplines in their cumulative impact assessment are included in Appendix 2-3 of the EIAR.

Consideration of Alternatives

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

Alternative Locations

The process of identifying a suitable wind farm site is influenced by a number of factors. Site selection for the development of a wind farm must be suitable for consideration under a number of criteria, such as:

- **Planning Policy:** Site location relative to Galway County Development Plan Wind Energy Capacity's classification of areas considered that have capacity for wind farm development from a planning policy perspective;
- **Environmental Sensitivities:** Located outside areas designated for protection of ecological species and habitats;
- **Grid Connection:** Access to the national electricity grid possible within a viable distance;
- **Sensitive receptors:** Capable of complying with required setbacks from sensitive receptors.
- **Site Scale:** Sufficient area of unconstrained land that could potentially accommodate a wind farm development and turbine spacing requirements;

The Proposed Wind Farm site has been identified as having potential for a wind energy development as a result of a nationwide search of suitable lands. The site selection process has been constraints and facilitators led. Facilitators are factors that give an advantage to a proposed project, while constraints are restrictions that inform the location and design of a project by highlighting sensitivities. A constraints analysis was undertaken and included avoidance of environmental designations (Natura 2000 sites), review of national, regional and local policies and objectives, suitable wind speeds, adequate setbacks from sensitive receptors, proximity to national grid nodes, avoidance of direct impacts on known cultural heritage assets, access and constructability.

Alternative Renewable Energy Technologies

Both onshore and offshore wind energy development will be required to ensure Ireland reaches the target set in the Climate Action Plan to source 80% of our electricity from renewable energy by 2030. When considering other renewable energy technologies in the area, the Applicant considered offshore wind and commercial solar energy production as an alternative on the Proposed Wind Farm.

Offshore Wind

Enerco Energy Ltd has a keen interest in offshore wind farms and has explored potential offshore sites. However, it is considered that due to delays with the regulatory process for offshore development, a combination of both onshore and offshore wind farm development will continue to be required to deliver on the ambitious renewable energy targets set under the Climate Action Plan 2023 which include focusing on onshore wind energy developments to reach the 2025/2030 renewable energy targets. As such, Enerco's primary focus remains to be onshore wind farms and they will continue to explore potential development offshore in tandem with delivering suitable sites onshore such as the Proposed Project.

The Applicant is an associated company of Enerco Ltd, an Irish owned developer with extensive experience in the design, construction and operation of onshore wind energy developments throughout Ireland.

Solar Energy

To achieve the same electricity output from solar energy as is expected from the Proposed Wind Farm (56MW), a larger development footprint would be required. The Site encompasses an area of approximately 944ha and the permanent footprint of the Proposed Project measures approximately 13.8ha, which represents approximately 1.4% of the Site.

Alternative Turbine Numbers and Model

It is proposed to install 8 turbines at the Proposed Wind Farm which could achieve a generating capacity of 56 MW. Such a wind farm could also be achieved on the Proposed Wind Farm by using smaller turbines (for example 2.5 MW machines). However, this would necessitate the installation of over 22 turbines to achieve a similar output. Furthermore, the use of smaller turbines would not make efficient use of the wind resource available having regard to the nature of the Proposed Wind Farm. A larger number of smaller turbines would result in the wind farm occupying a greater footprint within the Proposed Wind Farm site, with a larger amount of supporting infrastructure being required (i.e., roads etc) and increasing the potential for environmental impacts to occur.

Alternative Turbine Layout and Development Design

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

Following the mapping of all known constraints, detailed site investigations were carried out by the project team, which allowed for the identification of viable development areas. The ecological assessment of the Site encompassed habitat mapping and extensive surveying of birds and other fauna. This assessment, as described in Chapter 6 of this EIAR on Biodiversity, optimised the decision on the siting of turbines and the carrying out of any development works, such as the construction of roads. The hydrological assessment of the Proposed Wind Farm included collecting data from local private and public wells to monitor groundwater levels over time. As detailed in Chapter 9, Water, this data, which was collected over approximately 2 years, was used to design the turbine foundations and other infrastructure on the Proposed Wind Farm. Geophysical surveys were also carried out on the Proposed Wind Farm site. These geophysical surveys were used to identify suitable areas for turbines to be sited in relation to the underlying limestone bedrock.

The final proposed layout takes account of the results of all onsite investigations and baseline assessments that have been carried out during the EIAR process, including noise, landscape and visual. The final chosen layout is considered the optimal layout given it has the least potential for environmental effects.

Alternative Grid Connection Cabling Route Options

The Megawatt (MW) output of the Proposed Wind Farm is such that it needs to connect to a 110kV substation, with Cloon 110kV substation identified as the optimum connection node for the Proposed Project. A key consideration in determining the grid connection method for a proposed wind energy development is whether the cabling is underground or run as an overhead line. While overhead lines are less expensive and allow for easier repairs when required, underground lines will have no visual impact. For this reason, it was considered that underground cabling would be a preferable alternative to overhead lines. The Guidelines also indicate that underground cables are the preferred option for

connection of a wind energy development to the national grid. The underground electrical cabling will follow the route of existing public roads, thereby minimising the amount of ground disturbance required.

The final Proposed Grid Connection design also takes account of the findings from all site constraints (e.g., ecology, archaeology, hydrology, peat depths etc.), site investigations and baseline assessments, and design constraints (e.g., third party lands) that have been carried out during the EIA/R process.

Alternative Transport Route and Site Access

Wind turbine components (blades, nacelles and towers) are not manufactured in Ireland and therefore must be imported from overseas and transported overland to the Proposed Wind Farm. With regard to the selection of a transport route to the Proposed Wind Farm, alternatives were considered in relation to turbine components, general construction-related traffic, and site access locations.

The alternatives considered for the port of entry of wind turbines into Ireland for the Proposed Project include Port of Galway, Shannon Foynes Port and Dublin Port. Shannon Foynes Port is the principal deepwater facility on the Shannon Estuary and caters for dry bulk, break bulk, liquid and project cargoes. Port of Galway and Dublin Ports also offers a roll-on roll-off procedure to facilitate import of wind turbines. All three ports and indeed others in the state, offer potential for the importing of turbine components. The primary chosen port of entry is Galway Port due to its proximity and ease of access to the Proposed Wind Farm.

Alternative Mitigation Measures

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

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

1.4

Description of the Proposed Project

This section of the Environmental Impact Assessment Report (EIAR) describes the Proposed Project and all its component parts. Consultation with An Bord Pleanála confirmed that the Proposed Project will be subject to a dual consenting process, with development relating to the Proposed Grid Connection being subject to a separate planning application under Section 182A of the Planning and Development Act, 2000, as amended. The current planning application, relating to the Proposed Wind Farm, is being made to An Bord Pleanála under Section 37E of the Planning and Development Act, 2000, as amended.

The Proposed Wind Farm will consist of the provision of the elements as outlined in Section 1.1 Introduction.

The overall layout of the Proposed Project is shown on Figure 4-1 in Chapter 4 of this EIAR, this includes the Proposed Wind Farm site and the Proposed Grid Connection. The Proposed Wind Farm site layout is shown in Figure 4-2. The Proposed Grid Connection layout is shown in Figure 4-3. Detailed planning application drawings of the Proposed Wind Farm are included in Appendix 4-1 to this EIAR, and drawings of the Proposed Grid Connection are included in Appendix 4-8. All elements of the Proposed Project have been assessed as part of this EIAR.

The proposed wind turbine layout has been optimised using wind farm design software (WindPro) to maximise the energy yield from the Proposed Wind Farm site, while maintaining sufficient distances between the proposed turbines to ensure turbulence and wake effects do not compromise turbine performance. The Grid Reference coordinates of the proposed turbine locations are listed in Table 4-1 below.

Table 4-1 Proposed Wind Turbine Locations and proposed top of foundation level

Turbine	ITM Coordinates		Top of Foundation Elevation (mOD)
	Easting	Northing	
T1	534719	743135	25
T2	535362	743777	33
T3	535624	743329	35
T4	536599	744396	54
T5	536497	743788	43
T6	536894	743549	37
T7	537371	743516	39
T8	538278	743808	40

The turbine model to be installed on the Site will have an overall turbine tip height of 185 metres, a blade rotor diameter of 163 metres and hub height of 103.5 metres. Modern wind turbines from the main turbine manufacturers have evolved to share a common appearance and other major characteristics, with only minor cosmetic differences differentiating one from another. The wind turbines that will be installed on the Proposed Wind Farm 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 Proposed Wind Farm site makes use of the existing road network insofar as possible. It is proposed to upgrade approximately 1.5 kilometres of existing roads and tracks, and to construct approximately 6.4 kilometres of new access road on the Proposed Wind Farm site. Areas such as wide junctions and proposed hardstands will be used as passing bays throughout the construction phase of the Proposed Wind Farm site.

Each turbine will be connected to the on-site electricity substation (part of the Proposed Grid Connection) via underground 33 kV (kilovolt) electricity cabling. Fibre-optic cables will also connect each wind turbine and the met mast to the onsite substation. The electricity and fibre-optic cabling connecting to the onsite substation compound will be run in cable ducts approximately 1.2 metres beneath ground level, along the sides of roadways and/or under the roadways.

One 30m metrological (met) mast is proposed as part of the Proposed Wind Farm. The met mast will be equipped with wind monitoring equipment at various heights.

A temporary construction compound measuring approximately 4,030 square metres in area will be located in the eastern section of the Proposed Wind Farm site, along the access road east of T8. This construction compound will consist of temporary site offices, staff facilities and car-parking areas for staff and visitors. Temporary port-a-loo toilets and toilets located within a staff portacabin will be used during the construction phase. Wastewater from staff toilets will be directed to a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to wastewater treatment plants. There will also be a water supply on site for hygiene purposes, by way of a temporary storage tank. The construction compound will also include a bunded refuelling and containment area for the storage of oil, lubricants and site generators etc, and full retention oil interceptor.

A temporary security cabin will be located on a layby off the new proposed access road, just inside the Proposed Wind Farm site entrance off the L61461 Local Road.

As part of the Proposed Wind Farm, there will be a loss of approx. 1800m of linear habitat (hedgerow/treeline) to accommodate the footprint of the Proposed Project, including turbines and associated bat buffers, wind farm roads and other key infrastructure. This will be offset through the replanting of 3600m of hedgerow habitat within the Site which will provide a 100% net gain of linear habitat. The hedgerows will be replanted within the suitable areas as outlined within the BMEP (Appendix 6-4).

As discussed, the Proposed Grid Connection will be subject to a separate planning application under Section 182A of the Planning and Development Act, 2000, as amended. The Proposed Grid Connection is detailed in Appendix 4-8 of this ELAR. The proposed onsite 110kV substation is located within agricultural land and will be accessed via the Proposed Wind Farm access roads.

The footprint of the proposed onsite 110kV substation compound measures approximately 8,230 square metres in area and will include 2 no. control buildings and the electrical substation components necessary to consolidate the electrical energy generated by each wind turbine, and export that electricity from the onsite 110kV substation to the national grid. The layout and elevations of the proposed onsite 110kV substation are shown in Appendix 4-8. The construction and exact layout of electrical equipment in the onsite 110kV substation will be to EirGrid / ESB Networks specifications.

Two control buildings will be located within the substation compound. The Independent Power Producer (IPP) Control Building will measure approximately 19 metres by 11 metres and 7 metres in height. It will be located at the western edge of the substation compound. The EirGrid Control Building will be located towards the centre of the substation compound and will measure approximately 25 metres by 18 metre and 8.5 metres in height.

A temporary construction compound measuring approximately 2,610 square metres in area will be located adjacent to the eastern boundary of proposed onsite substation. This construction compound will consist of temporary site offices, staff facilities and car-parking areas for staff and visitors.

Temporary port-a-loo toilets and toilets located within a staff portacabin will be used during the construction phase. Wastewater from staff toilets will be directed to a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to wastewater treatment plants. There will also be a water supply on site for hygiene purposes, by way of a temporary storage tank. The construction compound will also include a bunded refuelling and containment area for the storage of oil, lubricants and site generators etc, and full retention oil interceptor.

It is proposed to connect the onsite 110 kV substation within the Proposed Wind Farm site to the existing 110 kV Cloon substation near Tuam, Co Galway via 110 kV underground electrical cabling. The underground electrical cabling route is approximately 14.3km in length and is located primarily within the public road corridor, with a short section of the route (approximately 2.1km) located within the Proposed Wind Farm access road.

The underground electrical cabling route will originate at the proposed onsite 110kV substation and run east and south for approximately 2.1km through the Proposed Wind Farm access road towards the L61461 Local Road. The cabling route continues underneath the L61461 Local Road for approximately 0.3km before following the N83 National Road. Upon joining the N83, the cabling will travel north in the verge of the road for approximately 7.6km before travelling east/southeast along the L6141 Local Road for 4.3km before turning right into the existing 110kV Cloon Substation compound in the townland of Cloonascragh.

It is proposed to manage any spoil generated through construction activities locally within the Site, in identified spoil management areas, as shown in Figure 4-1 of Chapter 4 of this EIAR, and in linear berms along access roads and turbine hardstand areas where appropriate.

A drainage design for the Proposed Project, incorporating all principles and measures outlined in this drainage design description, has been prepared, and is included in Appendix 4-6 to this EIAR. The drainage design employs the various measures further described below and is cognisant of a number of guidance documents as detailed in Section 4.5.3 of Chapter 4 of this EIAR.

It is estimated that the construction phase of the Proposed Project will take approximately 18-24 months from commencement of civil works to the full commissioning of the wind turbines. The commencement of works where the removal of vegetation is required, or where works take place in sensitive breeding habitats will be scheduled to occur outside the bird breeding season (1st March to 31st August) to avoid any potentially significant effects on nesting birds. Construction may commence from September to March so that construction activities are ongoing by the time the next bird breeding season comes around and can continue throughout the bird breeding season.

The Proposed Wind Farm is expected to have a lifespan of approximately 30 years. As part of the Proposed Wind Farm planning application, permission is being sought for a 30-year operation period commencing from the date of full operational commissioning of the Proposed Project. During the operational period, on a day-to-day basis the wind turbines will operate automatically, responding by means of meteorological equipment and control systems to changes in wind speed and direction.

The wind turbines proposed as part of the Proposed Wind Farm are expected to have a lifespan of approximately 30 years. Following the end of their useful life, the equipment may be replaced with a new technology, subject to planning permission being obtained, or the Proposed Wind Farm site may be decommissioned fully. The Proposed Grid Connection underground electrical cabling route and onsite substation will remain in place as it will be under the ownership and control of the ESB and EirGrid.

1.5

Population and Human Health

One of the principal concerns on the development process is that human beings, as individuals or communities, should experience no significant diminution of their quality of life from the direct,

indirect or cumulative effects arising from the construction, operation and decommissioning of a development. Ultimately, all the effects of a development impinge on human beings, directly and indirectly, positively and negatively. The key issues examined in Chapter 5 of the EIAR include population, human health, employment and economic activity, land use, residential amenity (including visual amenity, shadow flicker and noise), community facilities and services, tourism, property values, traffic and health and safety.

The Proposed Project is located 9km southwest of Tuam and 10km north of Claregalway, adjacent to the N83 National Road in Co. Galway.

Current land-use on the Proposed Wind Farm site comprises small scale agriculture. Current land-use along the Proposed Grid Connection underground cabling route comprises public road corridor. Land-use in the wider landscape of the Site comprises a mix of agriculture, quarries, residential and one-off housing.

The design, construction, operation and decommissioning of the Proposed Project will provide employment for technical consultants, contractors and maintenance staff. As discussed, it is proposed to construct the Proposed Wind Farm and Proposed Grid Connection infrastructure concurrently which would require approximately 100 employees in total, with an estimated 80 jobs focussing on the construction phase of the Proposed Wind Farm. The construction phase of the Proposed Project will last between 18-24 months and the decommissioning phase will likely last approximately 6-9 months.

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

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

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

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

The Guidelines set out a threshold of 30 hours per year or 30 minutes per day of shadow flicker at sensitive receptors within 500 metres of a proposed turbine location. As set out in the Guidelines, there is a low probability of any shadow flicker effects occurring beyond 10 rotor diameters. A study area of 10 rotor diameters was assessed for shadow flicker effects. In this case, the rotor diameter proposed for this project is 163m. As such, the shadow flicker study area in this case is 1.63km. A significant minimum separation distance of 768m from sensitive receptors has been achieved with the project design. There are 243 no. sensitive properties located within 1.63km (i.e., the shadow flicker study area

of ten times the rotor diameter, $10 \times 163\text{m} = 1.63\text{km}$ as per the Guidelines of the proposed turbines, of which 242 are inhabited and 1 is an uninhabited derelict building.

The potential shadow flicker occurring at sensitive receptors located within the Shadow Flicker Study Area was calculated using the WindFarm computer software (version number 5.0.2.2) and a regional sunshine factor of 26.46% was applied. Of the 243 no. sensitive receptors modelled, it is predicted that 104 no. sensitive receptors may potentially experience daily shadow flicker in excess of the Guidelines threshold of 30 minutes per day, in the absence of mitigation measures. Exceedances of annual shadow flicker levels (30 hours per year) are predicted to occur at 5 no sensitive receptors. However, this prediction does not consider wind direction or screening provided by intervening vegetation and topography.

Where daily or annual shadow flicker exceedances are experienced, suitable mitigation measures as outlined in Chapter 5 will be employed at the potentially affected properties to ensure that the limits set out in the Guidelines are not exceeded at any sensitive receptor within the Shadow Flicker Study Area. It is also noted that the Proposed Project can be brought in line with the requirements of the Draft Guidelines should they be adopted while this application is in the planning system, through an alteration of the implementation of the mitigation measures outlined in Chapter 5.

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

1.6

Biodiversity

Chapter 6 of the EIAR assesses the likely significant effects (both alone and cumulatively with other projects) that the Proposed Project may have on Biodiversity, Flora and Fauna, and sets out the mitigation measures proposed to avoid, reduce or offset any potential significant effects that are identified.

To inform the assessment, a comprehensive desk study and suite of field surveys have been carried out. Multidisciplinary walkover surveys were undertaken on the 17th of August 2023, 20th of September 2022, 11th of July 2022, 4th of July 2022 and 30th of July 2021. Habitat surveys of the Site covered the recognised optimum period for vegetation surveys/habitat mapping, i.e. April to September (Smith *et al.*, 2011). Dedicated species/habitat specific surveys including for bats, marsh fritillary, protected mammals and detailed habitat assessment surveys were carried out, during which any incidental records of other species were also recorded. In addition, fisheries surveys and aquatic macroinvertebrate surveys have been undertaken as part of the detailed baseline assessment, the detailed results of which are provided in technical appendices to this EIAR.

The multi-disciplinary walkover surveys comprehensively covered the lands within the EIAR Site Boundary and based on the survey findings, further detailed targeted surveys were carried out for features and locations of ecological significance. These surveys were carried out in accordance with NRA Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes (NRA, 2009).

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

The habitats on the Site were the subject of a detailed survey and assessment and habitat mapping. This habitat mapping and assessment was undertaken following the 'A Guide to Habitats in Ireland' (Fossitt, 2000). Limestone, heath and grassland habitats have also been categorised according to the Irish Vegetation Classification system.

The Proposed Wind Farm site comprises silage and grazing pastures categorised as Improved agricultural grassland (GA1) and bordered by stone walls (BL1) and hedgerows (WL1). There are no surface watercourses present within the Proposed Wind Farm site. There are some areas of Annex I limestone pavement within the Proposed Wind Farm site and associated habitats including calcareous heath and calcareous grassland. These areas were identified early in the design stage of the Proposed Project and the site layout has been designed to avoid these habitats. Therefore, these high conservation value habitats are completely outside of the Proposed Project footprint.

The majority of the lands on either side of the road along the length of the Proposed Grid Connection Underground Cabling Route (which is restricted to the existing road) comprise stone walls (BL1), dry meadows and grassy verges (GS2), agricultural grasslands (GA1), wet grasslands (GS4) and peatlands further east along the route. Hedgerows (WL1) and treelines (WL2) also border the road. There are four water crossings along the route.

The construction of the Proposed Wind Farm will result in the direct loss of approximately 23.3ha of improved agricultural grassland (GA1). This habitat is assessed as being of local importance (lower value), the loss of which is not considered significant at any scale. The Proposed Grid Connection underground cabling route will not result in the permanent loss of any habitat. The works will be restricted to the existing road categorised as Buildings and Artificial Surfaces (BL3). This is not significant at any geographic scale. The construction of the Proposed Project will result in the loss of approx. 1800m of hedgerow (WL1) and treeline (WL2) habitat. However, a Biodiversity Management and Enhancement Plan is in place as part of the Proposed Project. This Plan sets out measures to plant 3600m of hedgerow/treeline habitat within the Site. In addition, as an enhancement measure, the Biodiversity Management and Enhancement Plan also includes for the management and reversion of

improved agricultural grassland back to a species-rich calcareous grassland community which is typical of the area. The farm plan will commence during the construction phase of the Proposed Project and will be maintained for the operational lifetime of the Proposed Project. These measures will provide a biodiversity net gain as part of the Proposed Project and are detailed within the Biodiversity Management and Enhancement Plan (Appendix 6-4 of the EIAR).

Bat species composition and abundance was found during detailed bat surveys undertaken at the Proposed Wind Farm site to be typical of the geographic location and the largely open nature of the Proposed Wind Farm site. Bats as an Ecological Receptor have been assigned Local Importance (Higher value) on the basis that the habitats within the study area are utilized by a regularly occurring bat population of Local Importance. Following the implementation of mitigation, no potential for residual significant effects with regard to loss of commuting and foraging habitat, loss or damage to roosts, displacement or other construction phase impacts have been identified; the proposed net gain in linear landscape features within the site will result in a long-term positive impact on bats at the local level. In relation to potential collision risk and injury with operational turbines, a bespoke adaptive monitoring and mitigation strategy has been devised for the Proposed Project in line with NatureScot (2023) Guidance, which will ensure that there is no potential for significant residual effects on local bat populations during the operational phase of the Proposed Project.

There are no surface water courses or suitable habitats for otter within the Proposed Wind Farm site. There are 4 no. watercourse crossings along the Proposed Grid Connection underground cabling route. Evidence of otter activity was found in the form of spraint along the Clare River. However, no otter holts or other resting places were recorded during any of the ecological surveys. There is no potential for direct loss or fragmentation of significant otter habitat including loss of breeding or resting places. All proposed watercourse crossings are within existing bridge crossings, and so no in-stream works are proposed. Given that no otter holts or resting places were recorded within the Site, no direct mortality, significant disturbance or any barrier to the movement of otter is anticipated.

Four badger setts were recorded within the Proposed Wind Farm site, one main sett comprising 12 entrances, and three outlier setts comprising one to three entrances. Evidence of activity was seen at the setts in the form of freshly dug soil. Evidence of badger activity was found throughout the Site in the form of fresh scats, snuffle holes, trails and latrines. The badger setts were identified early on in the design stage of the Proposed Project and as a result, the site layout has been designed to avoid impacts on these setts. In addition, pre-commencement surveys for badger will be carried out. With these measures in place, there is no potential for significant effect to badger via habitat loss or disturbance.

Given the presence of Devil's Bit Scabious (*Succisa pratensis*) within limestone habitats within the site (but completely outside of the Proposed Project footprint), dedicated surveys for Marsh Fritillary (*Euphydryas aurinia*) larval webs were undertaken in September 2022 and August 2023. No records of Marsh Fritillary were found within the Site.

Irish hare (*Lepus timidus ssp. hibernicus*) and Irish stoat (*Mustela erminea hibernica*) were observed on occasion within the Site, however no potential for impacts on these species were identified. No signs of any additional protected fauna were recorded within the Site during the survey work undertaken.

No residual significant effects on surface water quality, groundwater quality or the hydrological/hydrogeological regime were identified during construction, operation, or decommissioning. No significant effects as a result of groundwater pathways to nearby designated turlough sites or on local groundwater was identified. A full hydrological assessment in relation to the Proposed Project has been carried out in Chapter 9 of the EIAR.

In relation to nationally designated sites, Lough Corrib pNHA [000297] was identified as being within the Likely Zone of Impact and is assessed in the EIAR.

In relation to European designated sites, Lough Corrib SAC [000297] and Lough Corrib SPA [004042] have been fully assessed within the Appropriate Assessment Screening and Natura Impact Statement

(NIS) that accompanies this planning application along with this EIAR. The NIS has been prepared to provide the competent authorities with the information necessary to complete an Appropriate Assessment screening and an Appropriate Assessment for the Proposed Project in compliance with Article 6(3) of the Habitats Directive. The NIS concludes that the Proposed Project, individually or in combination with other plans or projects, will not adversely affect the integrity of any European Site.

It is therefore judged that, provided that the Proposed Project is constructed and operated in accordance with the design, best practice and mitigation that is described within this application, significant individual or cumulative effects on ecology are not anticipated at the international, national, county, or local scales or on any of the identified KERs.

1.7

Ornithology

Chapter 7 of the EIAR assesses the likely significant effects that the Proposed Project may have on bird species. Firstly, a brief description of the Proposed Project is provided. This is followed by a comprehensive description of the methodologies that were followed in order to obtain the information necessary to complete a thorough assessment of the potential effects of the Proposed Project on bird species. The survey data is presented in full in the Environmental Impact Assessment Report (EIAR) appendices with a summary of the information presented within this chapter. An analysis of the results is then provided, which discusses the ecological significance of the birds recorded within the study area. The potential effects of the Proposed Project are then described in terms of the construction, operation and decommissioning phases of the project. An accurate prediction of the effects is derived following a thorough understanding of the nature of the Proposed Project along with a comprehensive knowledge of bird activity within the 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 the NIS and its appendices. The measures ensure that the construction, operation and decommissioning of the Proposed Project will not adversely affect the integrity of any European sites.

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

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

1.8

Lands, Soils and Geology

Chapter 8 of the EIAR assess the likely significant effects of the Proposed Project on Land, Soils and Geology. The southern section of the Site is situated within a slightly elevated area of ground (~45-60mOD) within a broader area which is generally flat to locally undulating and with elevations generally ~30mOD. The northern section of the Site extends towards Tuam along the N83 road and consists of public roads along mainly flat agricultural lands. The land is mainly agricultural improved grassland, primarily used for grazing.

A comprehensive impact assessment of the Proposed Wind Farm site and the Proposed Grid Connection on the land, soils and geological environment has been undertaken. The assessment is based on a desk study, walkover surveys and a comprehensive data set which was obtained during site

investigations. The design of the Proposed Wind Farm is based on extensive site-specific data, with the layout intended to minimise impacts on the local land, soils and geological environment.

The geology of the Proposed Wind Farm site typically consists of sandy gravelly clay overburden, ranging between 1.1 – 16.5m and averaging 3.8m in depth. The overburden is a glacial deposit over typically strong to medium strong, medium grey Limestone, which is occasionally weathered but generally competent. In total over 230m of site investigation drilling has been completed across the Proposed Wind Farm site, with no evidence of karst conduits or voids encountered. Isolated and discrete weathered layers of Limestone were encountered in some boreholes, but this is typical of all Limestone bedrock in Ireland.

Excavation of soil, subsoil and bedrock will be required for site levelling and for the installation of the Proposed Wind Farm infrastructure. This will result in a permanent removal and on-site management of excess soil and subsoil across the Site. Excavated soil/subsoils and bedrock will be reused where possible, used for landscaping around turbine bases, or permanently placed in the proposed spoil management areas. Storage and handling of hydrocarbons/chemicals will be carried out using best practice methods. Measures to prevent soil and subsoil erosion during excavation, reinstatement and permanent management in spoil management areas will be undertaken to prevent water quality effects.

No significant effects on the land, soil and geology of the Site will occur during construction, operation, or during decommissioning phases of the Proposed Project.

Ground bearing foundations will be utilised at the 8 no. turbine locations due to the good ground conditions encountered during the comprehensive site investigation works.

Excavation of mineral subsoils and bedrock will be required for site levelling, infrastructure and foundations for the access roads and turbines. Estimated volumes of subsoils/bedrock to be removed at the 8 no. turbine foundations, hardstandings and along access roads is c.70,000m³. The handling and storage of soils and subsoils will be completed in accordance with the Spoil Management Plan as set out in Chapter 4.

An assessment of the construction stage, operational stage and decommissioning stage has been completed, and with implementation of the outlined mitigation measures, no likely significant effects on the soils and geology environment are predicted to occur.

The assessment confirms there will be no cumulative effects on land soil and geology environment as a result of the Proposed Project.

1.9

Hydrology and Hydrogeology

Chapter 9 of the EIAR assess the likely and significant effects of the Proposed Project on hydrology and hydrogeology.

On a regional scale, the Proposed Wind Farm site is located primarily within the Corrib catchment, within Hydrometric Area 30 (Corrib) of the Irish River Basin District. On a more local scale, the Proposed Wind Farm site is contained within the Clare(Galway)_SC_060 subcatchment. The River Clare is situated ~4.0km east of the Proposed Wind Farm site and flows south, while Lough Corrib is located ~4.3km to the west/southwest.

The Proposed Grid Connection underground cabling route is located within the Clare(Galway)_050 and Clare(Galway)_060 river waterbodies, within the Clare[Galway]_SC_060, Clare[Galway]_SC_040 and Clare[Galway]_SC_020 subcatchments.

The Proposed Wind Farm site is characterised by a distinct lack of surface watercourses. All rainfall within the Proposed Wind Farm will therefore infiltrate to ground.

A detailed baseline hydrological and hydrogeological investigation of the Proposed Wind Farm has been conducted between 2021-2023. Borehole drilling and trial pitting have been undertaken to determine the soils, subsoils and bedrock. Geophysics lines have been completed to correlate with the intrusive site investigation data. Due to the sensitive nature of the water environment near the Proposed Wind Farm, within a mapped regionally karstified aquifer, a detailed investigation of the groundwater levels, flow directions and hydrochemistry has been completed as well as an assessment of groundwater strikes within boreholes and the general characteristics of the limestone within the underlying bedrock.

Following these site investigation phases, conducted between 2021-2023, the large dataset of geological and hydrogeological information was analysed and synthesised to form a conceptual model of groundwater flow within the Proposed Wind Farm site and extending to the broader local area. This included analysis of water levels from Group Water Schemes and domestic/farm wells, EPA monitoring sites, and rainfall data. These data and hydrogeological understanding were used to develop a conceptual site model (CSM) (Note: CSM is a standard descriptor in hydrogeology). The CSM for the Proposed Wind Farm is founded on detailed hydrogeological information recorded during the site investigation process. The resulting groundwater levels, gradients and flow directions have been used to inform the impact assessment process.

There are 9 no. Group Water schemes within 5km of the Proposed Wind Farm site. Groundwater level monitoring has been completed in 8 no. of these schemes between 2021-2023, resulting in an extensive suite of continuous groundwater level data. These data have informed the conceptual groundwater model, particularly in terms of groundwater flow directions and seasonal variation. Baseline groundwater chemistry sampling has also been completed during 2 no. sampling rounds.

Groundwater levels within the Proposed Wind Farm site range between 8.2 – 30.8mOD, with groundwater flow in a westerly direction towards Lough Corrib.

The Proposed Wind Farm site and Proposed Grid Connection works involve excavation of soil and subsoils and bedrock, and creation of access tracks, and turbine foundations. Excavations and earthworks are also required at the Proposed substation and along the proposed Grid Connection underground cabling route, although the latter is temporary and transient and will be reinstated relative quickly. There is a risk that these proposed excavation works can potentially alter the recharge mechanisms that feed the groundwater system below the Site and also potentially alter the water quality within the groundwater systems. Such occurrences could impact on local groundwater quality, groundwater wells, and also on downgradient water dependent ecological receptors such as river systems and lakes.

During each phase of the Proposed Project (construction, operation and decommissioning) a number of activities will take place on the Site, some of which will have the potential to affect the hydrological regime or water quality at the site or its vicinity. These significant potential impacts generally arise from sediment input from drainage water and other pollutants such as hydrocarbons and cement-based compounds, with the former two having the most potential for impact, given the underlying hydrological regime (indirect recharge to groundwater – and no direct surface water runoff/discharges).

A key design criterion for the Proposed Wind Farm site is to avoid potential karst anomalies or weathered bedrock at proposed turbine locations. This has been achieved with the proposed layout as iterative site investigation works have been completed (drilling and geophysical surveys). In addition, the detailed site investigation works that have been completed demonstrate that there is a significant lack of groundwater strikes (fractures/faults/cavities) within the upper ~20m of the Limestone bedrock. This is proven by the borehole drilling completed at the site between 2021-2023, and is also inferred from the depth of local group water schemes. The perception of this area of Galway is that it is significantly karstified and groundwater is abundant in the bedrock. This has been shown to not be the case, and that groundwater in any substantial quantities is discrete and located at depth, and has therefore been avoided through iterative design.

All proposed Wind Farm and Grid Connection underground cabling route infrastructure will be installed above recorded groundwater levels, therefore there is no potential for this infrastructure to block or alter underlying groundwater flow regimes.

Drainage measures, pollution control and other preventative measures have been incorporated into the design of the Proposed Project to minimise significant negative impacts on groundwater quality and downstream designated sites.

The surface water drainage design will be the principal means of significantly reducing sediment in drainage water arising from construction activities and for the control of runoff/recharge. The key drainage water control measure is that there will be no direct discharge of the Proposed Wind Farm site drainage water without treatment prior to recharge. As there are no surface watercourses within the Proposed Wind Farm site, all water will be allowed to infiltrate to ground at the termination point of the drainage channels.

Preventative measures also include controls for fuel and concrete management and a waste management plan which will be incorporated into the Construction and Environmental Management Plan (refer to Appendix 4-5).

Overall, the Proposed Project presents no significant effects to surface water and groundwater quality provided the proposed mitigation measures are implemented.

As laid out in the assessment within Chapter 9, no significant cumulative effects on any of the regional surface water catchment or groundwater bodies will occur as a result of the Proposed Project.

1.10

Air Quality

Chapter 10 of the EIAR identifies, describes and assesses the potential significant direct and indirect effects on air quality arising from the construction, operation and decommissioning of the Proposed Project.

The EPA has designated four Air Quality Zones for Ireland:

- > Zone A: Dublin City and Environs
- > Zone B: Cork City and Environs
- > Zone C: 16 urban areas within population greater than 15,000
- > Zone D: remainder of the country

These zones were defined to meet the criteria for air quality monitoring, assessment and management as described in the which Directive, Framework Directive and Daughter Directives.

The air quality zone for the Site was selected, followed by a review of EPA collated baseline air quality data namely Sulphur Dioxide (SO₂), Particulate Matter (PM₁₀), Nitrogen Dioxide (NO₂), Carbon Monoxide (CO) and Ozone (O₃) for the selected air quality zone to determine the representative levels of such emissions for the Proposed Project. The Site lies within Zone D, which represents rural areas located away from large population centres.

The air quality in the vicinity of the Proposed Project is typical of that of rural areas of Ireland, i.e., Zone D. Prevailing south-westerly winds carry clean, unpolluted air from the Atlantic Ocean onto the Irish mainland. The EPA publishes Air Monitoring Station Reports for monitoring locations in all four Air Quality Zones. The most recent report on air quality in Ireland, 'Air Quality in Ireland 2022' was published by the EPA in 2023. The EPA reports provide SO₂, PM₁₀, NO₂ and O₃ concentrations for areas in Zone D. These are detailed in Section 10.2.4 of Chapter 10 of this EIAR.

Due to the non-industrial nature of the Proposed Project, and the general character of the surrounding environment, baseline air quality sampling was deemed to be unnecessary for this EIAR. It is expected that the air quality in the existing environment is good, since there are no major sources of air pollution (e.g. heavy industry) in the vicinity of the Site.

The production of energy from wind turbines has no direct air emissions as is expected from fossil fuel-based power stations. Harnessing more energy by means of renewable sources 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 temporary or short-term indirect emissions associated with the construction of the Proposed Project will include vehicular and dust emissions.

A Construction and Environmental Management Plan (CEMP) will be in place throughout the construction phase (see Appendix 4-5 of this EIAR), which includes dust suppression measures. In addition, turbines and construction materials will be transported to the site on specified transport routes only. The agreed transport route roads adjacent to the Site will be regularly inspected for cleanliness and cleaned as necessary.

By providing an alternative to electricity derived from coal, oil or gas-fired power stations, the Proposed Project will result in emission savings of carbon dioxide (CO₂), oxides of nitrogen (NO_x), and sulphur dioxide (SO₂). The production of renewable energy from the Proposed Project will have a long-term significant positive impact on air quality due to the offsetting of approximately 50,822 tonnes of Carbon Dioxide (CO₂) per annum, further detailed in Chapter 11 Climate.

1.11

Climate

Chapter 11 of the EIAR identifies, describes and assesses the potential significant direct and indirect effects on climate arising from the construction, operation and decommissioning of the Proposed Project.

The production of energy from wind turbines has no direct emissions as is expected from fossil fuel-based power stations. Harnessing more energy by means of wind farms will reduce dependency on fossil fuels, thereby resulting in a reduction in harmful emissions that can be damaging to human health and the environment.

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

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

The projections show that implemented policies and measures in the WEM scenario can deliver an 11% reduction in greenhouse gas emissions by 2030 compared to the 2018 level. The WAM scenario, including policies and measures from CAP, is projected to deliver a 29% emissions reduction over the

same period. This figure falls short of the legally binding commitment to achieving a 51% reduction in GHG emissions from 2021 to 2030, and to achieving net-zero emissions no later than 2050. Ireland's new 2030 target under the EU's Effort Sharing Regulation (ESR) is to limit its greenhouse gas emissions by at least 42% by 2030. This target was set in April 2023 upon amendment of the Emissions Sharing Regulation. For Ireland to achieve its national and international climate targets, it will require a full and rapid implementation of CAP measures and further measures to be implemented.

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

The full life cycle and embodied carbon of the proposed turbines have been taken account of in the Macaulay Institute model. The emissions associated with the embodied carbon, along with the construction phase transport movements of the remaining site infrastructure associated with the Proposed Project are considered using the Transport Infrastructure Ireland (TII) Carbon Tool (TII 2022)¹. The TII Carbon Tool is customised for road and light rail projects in Ireland, using emission factors from recognised sources during the construction, maintenance, and operation of TII projects in Ireland.

The carbon balance of proposed wind farm developments in peatland habitats has attracted significant attention in recent years as, in addition to the combustion of fossil fuels, greenhouse gases are also released through natural processes such as the decomposition of organic material (which is composed of carbon). Bogs and peatlands are known to store large amounts of carbon. There is no peat present within the development footprint at the Wind Farm. There are sections of very shallow peat along the Proposed Grid Connection underground cabling route, however the Proposed Grid Connection infrastructure will remain inside the road carriageway. Therefore the Proposed Project will not give rise to any impact on peat habitat..

The Proposed Project will have an estimated export capacity of 56MW and therefore will help contribute towards the achievement of national and international emission reduction targets. As well, it will provide much needed grid infrastructure and the capacity to offset a substantial volume of carbon dioxide over its operational lifetime thereby reducing the greenhouse gas effect. Please see Section 11.5.2.1.2 for details on carbon offset calculations.

Following construction of the Proposed Project, there will be a Permanent Imperceptible Negative Effect on Climate as a result of greenhouse gas emissions from construction plant and vehicles, embodied carbon associated with the turbines and construction materials. Operation of the Proposed Project will have no significant effect on climate.

1.12

Noise and Vibration

Chapter 12 of the EIAR provides an assessment into the likely environmental noise and vibration impacts of the Proposed Project, which comprises the Proposed Wind Farm along with the Proposed

Grid Connection, which, although not part of the current planning application, is assessed within the EIAR.

The background noise environment has been established through noise monitoring surveys undertaken at six noise sensitive locations (NSLs) surrounding the Proposed Wind Farm site. 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 derive appropriate noise criteria for the development in line with the Guidelines.

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 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 and mitigation measures 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.

The predicted turbine noise levels for the operational phase of the Proposed Wind Farm have been calculated in accordance with the IOA GPG recommendations. The assessment has confirmed that the residual turbine noise levels associated with the Proposed Wind Farm will be within the best practice noise criteria curves recommended in the Guidelines. Therefore, it is not considered that a significant effect is associated with the Proposed Wind Farm. The predicted Proposed Grid Connection operational phase noise levels have been calculated in accordance to best practice, and no significant effects are predicted to occur.

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

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

1.13

Archaeology and Cultural Heritage

Chapter 13 of the EIAR provides an assessment of the potential effects of the Proposed Project on the Cultural Heritage resource. Cultural heritage includes archaeology, architectural heritage and any other tangible assets. The assessment was based on desktop research, field survey, GIS based mapping, ZTV, and was also assisted by representative photomontages and photowire images.

Where potential effects have been identified appropriate mitigation measures have been recommended in order to minimise any such effects. Recommended mitigation includes a 30m buffer zone around a newly recorded possible enclosure, pre-development archaeological testing of the Proposed Project infrastructure and archaeological monitoring during the construction stage of the Proposed Project.

Potential indirect effects on the setting of any UNESCO World Heritage Sites and those on a Tentative List within 20km, National Monuments within 10km, recorded monuments within 5km and RPS/NIAH structures within 5km were included in order to assess potential effects on setting in the wider landscape. The ZTV demonstrates theoretical visibility of the proposed turbines from the majority of

cultural heritage assets within 5km and from National Monuments and those subject to a preservation order within 10km.

All cultural heritage assets within 100m of either side of the Proposed Grid Connection underground electrical cabling route were assessed for potential impacts to same. No direct effects to the recorded Cultural Heritage (archaeology, architectural heritage and any other tangible asset) resource as a result of the Proposed Grid Connection underground cabling route have been identified. Mitigation measures are recommended where deemed appropriate and include archaeological testing of greenfield areas and monitoring of ground works within the Zone of Notification for recorded monuments along the Proposed Grid Connection underground cabling route.

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

Landscape and Visual

Chapter 14 of this EIAR assesses the likely significant landscape and visual impacts arising as a result of the Proposed Project. Although all elements of the Proposed Project are assessed, the Chapter 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 Proposed Wind Farm, as well as effects on landscape character and the impact on sensitive landscape receptors and Landscape Character Units (LCUs). Visibility of the proposed turbines was assessed from receptors within a study area extending 20km 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 Wind Farm site is located in a settled agricultural landscape comprising fields of grazing pasture delineated by stone walls and mature hedgerows. The immediate setting of the Proposed Wind Farm site is a sparsely populated, working landscape, set back from large settlements and population centres. The proposed turbines were sited on a flat landscape, where local undulations and vegetation limit long range views in the wider LVIA Study Area.

On-site visibility appraisals, ZTV mapping, a Route Screening Analysis and assessment of over 40 no. viewpoint locations (15 No. in the EIAR Volume 2: Photomontage Booklet and 26 No. in Appendix 14-5) determined that visibility of the proposed turbines will be very limited from locations beyond 5 km from the proposed turbines. Visibility of the proposed turbines beyond the immediate landscape setting of the Proposed Wind Farm site is limited to localised areas of high elevation where open views across the flat and vegetated landscape are available from elevated vantage points, which is in general not a common occurrence in the 20km LVIA Study Area.

The landscape value of the Proposed Wind Farm site is deemed to be of 'Low' value and the sensitivity of this landscape to wind farm development is deemed to be 'Low'. The introduction of vertical man-made structures and ancillary infrastructure will substantially alter the landscape comprising the proposed infrastructure footprint at the Proposed Wind Farm site. The proposed turbines amount to direct long-term 'Moderate' landscape effects upon the physical fabric of the landscape of the Proposed Wind Farm site itself. In terms of effects on Landscape Character, the proposed turbines are located within Galway LCU-6a - Black River Basin Unit. In terms of the sensitivity of this landscape, the entirety of this LCU is located an area designated as 'Low' Sensitivity within the GCDP 2022-28. The magnitude of change was deemed to be 'Moderate' as the addition of uncharacteristic new features (turbines) will cause a change in landscape character in a localised area but will not redefine the character of the LCU.

All other LCUs within 15km of the proposed turbines were comprehensively assessed in Appendix 14-2. Effects on landscape character from these LCUs only relate to impacts on perceptual and aesthetic qualities. The proposed turbines will not materially alter these landscape receptors and likely effects upon landscape character were not deemed to be significant. Residual effects on landscape character were deemed to be 'Not Significant' for two other LCUs, 'Slight' from two other LCU. Lough Corrib was identified as a 'high' sensitive landscape receptor. At its closest point Lough Corrib is located approximately 4.3km southwest of the nearest proposed turbine (T1). On site appraisals found that the landscape surrounding Lough Corrib was highly vegetated and actual visibility is highly unlikely. VP14 shows a view from Kilbeg Pier on the east side of the lake, the turbines are slightly visible over the vegetation in the background of the view. No significant landscape and visual effects were deemed to occur from Lough Corrib.

Photomontages were used to illustrate the assessment of the visual effects arising as a result of the Proposed Project from 15 No. viewpoint locations. The assessment concluded that no 'Profound' or 'Very Significant' effects occurred at any of the 15 viewpoints. Residual effects of 'Significant' occurred at 2 of the 15. No viewpoints. In these two cases (VP06 and VP04) a residual effect of 'Significant' is due to the proximity of the visual receptor (<1km from the proposed turbines). A residual effect of

'Moderate' was deemed to arise at 6 of the 15 No viewpoints. All other viewpoints were assessed as resulting in 'Slight' (4) or 'Not Significant' (3) residual visual effects.

Considering the limited visibility of the proposed turbines from distant receptors, the assessment of visual effects focussed on locally sensitive residential receptors and rural settlement clusters which will have views of the proposed turbines. 6 of the 15 Photomontage Viewpoints and 11 of the 26 Photowire Viewpoints are located within 3km of the proposed turbines. These viewpoints were specifically selected to assess the visual effects on residential amenity and receptors of local community importance in close proximity to the Proposed Wind Farm site.

Knockma Hill, a local walking trail, is located within 5km of the proposed turbines. Although it is not designated in the GCDP 2022-28, the walking trails on the hill are of local significance to the community and therefore the viewpoint (VP07) captured from this location was given a 'High' sensitivity. This location has panoramic views of the farmland landscape and Lough Corrib. The proposed turbines are visible within the panoramic views but do not detract from the views of Lough Corrib. 'Moderate' residual effects were deemed to arise at this location.

Cumulative effects on landscape character are included in the impact assessment outlined in Appendix 14-2. Cumulative visual effects are also discussed and summarised in Appendix 14-3 and above in this Chapter. The flat terrain and high screening levels prevent wind energy developments from dominating the landscape. In general, views of both the proposed turbines and cumulative turbines in combination will be limited as a result of the flat terrain and vegetated landscape. There is a likelihood that the proposed turbines may potentially be seen in succession with the existing Cloonlusk turbines, the proposed Shanclon turbines or the proposed Clonberne turbines. . There will be instances from locations within LVIA Study Area where there will be visibility of the proposed turbines in one direction and the existing Galway Wind Park and surrounding turbines will be visible in another direction. Views of the proposed turbines and these wind farm developments will only likely be from isolated areas within the LVIA Study Area. The assessments determined that no significant cumulative landscape and visual effects will occur with any of existing, permitted or proposed wind farm development.

The proposed turbines are suitably sited and scaled within the landscape. Considering the limited visual exposure of the proposed turbines and relatively limited number of sensitive landscape and visual receptors impacted within the LVIA Study Area, the Proposed Project is deemed to be acceptable from a landscape and visual perspective.

1.15 Material Assets

This chapter of the EIAR addresses the likely significant effects of the Proposed Project on transportation infrastructure (Section 15.1 Traffic and Transport), on Telecommunications and Aviation (Section 15.2) and Other Material Assets (Section 15.3), which are economic assets of human origin.

Roads, Traffic, Transport & Access

Introduction

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

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

Traffic Route & Study Area

The delivery route to the Site for the abnormally sized loads transporting the large turbine components commences at Galway Harbour. From Galway Harbour the route travels northeast through Galway City on the R339 and the R336 to the N83 at the junction with the N6 Bothar na dTreabh. From this point the route travels north on the N83 for approximately 19.4 kms through the village of Claregalway to the existing junction with the L-61461. Approximately 80m south of the L-61461 it is proposed to provide a new short, temporary access road which links back into the L-61461 at a point approximately 70m to the west of the existing N83 / L-61461 junction. The temporary access road will provide access for all construction related deliveries that will approach the site on the N83 from the south. From this point the route travels west on the L-61461 for approximately 300m to the location of a new junction on the north side of the L-61461 that will provide access to the Proposed Wind Farm site.

Vehicle types and network geometry

The types of vehicles that will be required to negotiate the local network will be up to 86.9 metres long and will carry a blade 81.5 metres in length.

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

Traffic impact on local network

the estimated impact of the development traffic on the turbine delivery route is laid out in Section 15.1 of the EIA.

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

- During the 8 days when the concrete foundations are poured, the effect on the surrounding road network will be negative. It is forecast that the increase in traffic volumes will range from +2.1% on the N83 between Claregalway and Loughgeorge (Link 1), to +3.7% on the N83 just to the south of the L-61461 (Link 2) to a 5-fold increase in traffic flows (+399.8%) on the L-61461 leading to the Proposed Wind Farm site (Link 3), which is currently lightly trafficked. This will have a temporary slight negative effect on the delivery route with the impact forecast to be moderate on the short section of the L-61461.
- For 227 days when the general construction and groundworks are undertaken it is forecast that the increase in traffic volumes will range from +1.0% on the N83 between Claregalway and Loughgeorge (Link 1), to +1.7% on the N83 just to the south of the L-61461 (Link 2) to a 184.9% increase on the L-61461 leading to the site (Link 3). This will have a temporary negative effect on the study network ranging from slight on the majority of the delivery route, to moderate on the short section of the L-61461 leading to the main access junction (Location 5, as discussed in Section 15.1.9).
- For 118 days when the Proposed Grid Connection Underground Cable is being constructed it is forecast that the increase in traffic volumes will range from +0.7% on the N83 between Claregalway and Loughgeorge (Link 1), to +1.2% on the N83 just to the south of the L-61461 (Link 2) to a 126.8% increase on the L-61461 leading to the site (Link 3). This will have a temporary negative effect on the study network ranging from slight on the majority of the delivery route, to moderate on the short section of the L-61461 leading to the main access junction.
- During the 22 days when the various component parts of the wind turbine plant are delivered to the Proposed Wind Farm site using extended articulated HGVs, the effect of the additional traffic on these days will be slight to moderate along the

turbine delivery route due to the size of vehicles involved, resulting in increased traffic volumes ranging from +0.5% on the N83 between Claregalway and Loughgeorge (Link 1), to +0.8% on the N83 just to the south of the L-61461 (Link 2) to an 92.5% increase on the L-61461 leading to the Proposed Wind Farm site (Link 3). It is forecast that there will be a negative temporary, slight effect on traffic flows as the delivery of the abnormally sized loads is undertaken at night.

- During the 8 days of the turbine construction stage when general materials are delivered to the Proposed Wind Farm site, it is forecast that the increase in traffic volumes on these days will range from +0.3% on the N83 between Claregalway and Loughgeorge (Link 1), to +0.5% on the N83 just to the south of the L-61461 (Link 2), to a 56.4% increase on the L-61461 leading to the Proposed Wind Farm site (Link 3).
- This will have a temporary imperceptible negative effect on the N83, and temporary slight negative effect on the L61461 leading to the Proposed Wind Farm site.
- With respect to the traffic volumes that will be generated during the construction of the Proposed Grid Connection underground cable route, all traffic for this and the substation will be delivered via the proposed new temporary link road. It is estimated that there will be approximately 14 daily return trips made by a truck transporting materials, and 7 return trips made by a car to transport construction staff, to and from the site. Short term diversions are forecast for local traffic although the traffic volumes that will be impacted on the local road network are low. By its nature the effects of these additional trips and diversions on the network will be transient, will be temporary and will be slight.

Once the Proposed Project is operational the traffic impact created by maintenance staff will be imperceptible. The residual effect for the decommissioning phase will be less than for the construction stage as set out above and will be slight to imperceptible. There will be no significant effects on Traffic and Transport due to the Proposed Project.

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, effecting, for example radio signals. The most significant potential effect occurs where the renewable energy development is directly in line with the transmitter radio path.

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

A total of 25 no. telecommunications links are within the vicinity of the Site. 8 no. links run in close proximity to proposed turbine locations. Appropriate buffer zones, agreed with the telecommunications operators, have been applied to these links. As such, no electromagnetic interference impacts for telecommunications assets or operations are associated with the Proposed Project.

Scoping responses received from both the Irish Aviation Department and the Department of Defence provided no specific requirements in relation to the completion of the EIAR but provided a number of observations in regard to obstacle lighting and notification of any works.

The closest large international airport to the Proposed Project is Knock Airport, which is located approximately 50km north of the Proposed Project. Knock Airport is outside the range at which such issues would be expected, and as detailed in Table 15-31 of Chapter 15 of this EIAR, the Irish Aviation Authority noted no issues with the Proposed Project however they issued observations as discussed in

Section 15.2.4.2 of Chapter 15 of this EIAR. There will be no significant effect on telecoms and aviation due to the Proposed Project.

Existing Built Services and Utilities

There is an overhead electricity cable which traverses the Proposed Wind Farm site in the eastern-most portion of the site. This overhead line is located 1.2km east of the nearest turbine. There are also 3 no. areas where overhead electricity lines cross over the Proposed Grid Connection. However, no impacts on overhead electricity lines are likely to occur due to the nature of the underground cabling installation works.

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

The Gas Networks Ireland underground gas pipeline travels from north to south through the Proposed Wind Farm site. Gas Networks Ireland confirmed the minimum setback distance in a scoping response, all of which have been achieved. Based on survey information, and information provided by Gas Networks Ireland, no impacts are likely to occur as the groundworks needed in order to construct the Proposed Wind Farm infrastructure will not interfere with the existing gas pipeline. There is also 1 no. water main identified within the Proposed Wind Farm site. The methodology for how the proposed internal wind farm infrastructure will traverse this water main is laid out in Chapter 4 of this EIAR.

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

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

1.16

Vulnerability of the Project to Major Accidents and Natural Disasters

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

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

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

risk assessment to develop an understanding of the vulnerability and resilience of the area to emergency situations.

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

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

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

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

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

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

1.17

Interactions of the Foregoing

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

The potential for interaction of effects has been assessed, throughout this EIAR, as part of the Impact Assessment process. While the work on all parts of the EIAR were not carried out by MKO, the entire project and all the work of the sub-consultants was managed and co-ordinated by the company. The

EIAR was edited and collated by MKO as an integrated report of findings from the impact assessment process, by all relevant experts, and effects that potentially interact have been assessed in detail in the individual chapters of the EIAR and summarised in Section 17.2 of Chapter 17 of this EIAR.

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