

NON-TECHNICAL SUMMARY

Introduction

This Environmental Impact Assessment Report ('EIAR') has been prepared by MKO on behalf of Curns Energy Ltd, which intends to apply to An Bord Pleanála for planning permission, in accordance with Section 37E of the Planning and Development Act 2000 (as amended), to construct a wind energy development and all associated infrastructure at Lyrenacarriga and other townlands, located in Counties Waterford and Cork.

The application meets the threshold for wind energy set out in the Seventh Schedule of the Planning and Development (Strategic Infrastructure) Act 2006, as confirmed by An Bord Pleanála, and is therefore being submitted directly to An Bord Pleanála ('the Board') as a Strategic Infrastructure Development (SID), in accordance with Section 37E of the Planning and Development Acts 2000 to 2019.

The EIAR will accompany the planning application for the proposed development to be submitted to the Board. The planning application will also be accompanied by a Natura Impact Statement (NIS).

The proposed development site is located approximately 5 kilometres (km) southeast of Tallow, Co. Waterford and approximately 9 kilometres northwest of Youghal, Co. Cork. The site is accessed via local roads from the R634 Regional Road, which travels in a northwest-southeast direction between Tallow and Youghal, and the R627 Regional Road, which travels in northeast-southwest direction between Tallow and Middleton. The site itself is served by a number of existing forestry roads, access points and grid infrastructure, which will be used for the proposed development. The proposed development site encompasses two clusters of turbines located in eastern and western sections, which will be connected via underground connector cabling.

Current land-use on the site comprises coniferous forestry and agriculture. Land-use in the wider landscape comprises a mix of agriculture, commercial forestry and low-density residential.

The proposed development is being brought forward in response to local, national, regional and European policy regarding Ireland's transition to a low carbon economy and associated climate change policy objectives. The portion of the proposed Lyrenacarriga Wind Farm site in Co. Waterford is located within an area designated as '**Preferred**' for wind energy development by the Wind Energy Strategy of the '*Waterford County Development Plan 2011-2017 (as extended)*'. The portion of the proposed development site in Co. Cork is located within an area designated as '**Open to Consideration**' for wind energy development by the Wind Energy Strategy as part of the '*Cork County Development Plan 2014-2020 (as varied)*'.

The townlands in which the proposed site and ancillary works are located are listed in Table 1 below.

Table 1 Townlands within which the proposed development is located

Development Works	County	Townland
Wind turbines and access roads, Grid Connection and collector cabling, Substation including battery storage, Met mast, Construction Compounds & Borrow pits	Cork	Lyremountain, Lyre, Ballyanthonny, Knockanarrig, Breeda, Rearour North, Rearour South
	Waterford	Lyrenacarriga, Dunmoon South, Coolbeggan West, Propoge, Ballycondon Commons, Ballynatray Commons, Shanapollagh
Accommodation works on turbine delivery route	Cork	Breeda and Rearour South (one works location, at boundary of these townlands)
	Waterford	Killea

Applicant

Curns Energy is a joint venture between RWE Renewables Ireland Ltd (previously Innogy Renewables Ireland Ltd.), a subsidiary of the RWE Group and Highfield Energy Ltd. RWE Renewables ranks among the largest global players in power generation from renewable energy with a total installed generation capacity of 9 Gigawatts (GW) and an additional 2.6 Gigawatts under construction. Highfield Energy Ltd develops, constructs, owns and operates electricity generation projects with a particular focus on renewables. Highfield currently has over 1 Gigawatt (GW) of utility-scale wind, solar photovoltaic (PV) and energy storage projects within their portfolio.

Brief Description of the Proposed Development

The proposed development encompasses the construction of a wind farm comprising 17 wind turbines and all associated works. The proposed turbines will have a maximum blade tip height of up to 150 metres. The full description of the proposed development, as per the public planning notices, is as follows:

- i. Construction of up to 17 No. wind turbines with a maximum overall blade tip height of up to 150 metres;*
- ii. 1 no. Meteorological Mast with a maximum height of up to 112 metres;*
- iii. Construction of 1 no. staff welfare and storage facility including waste water holding tank;*
- iv. 1 no. permanent 110 kV electrical substation with 2 no. control buildings with welfare facilities, 10 no. battery containers, battery switchgear building, all associated electrical plant and equipment, security fencing, all associated underground cabling, waste water holding tank and all ancillary works;*
- v. Underground cabling connecting the turbines to the proposed substation and connection from the proposed substation to the national grid via a 110 kV loop in connection.*
- vi. Upgrade of existing tracks, roads and provision of new site access roads and hardstand areas;*
- vii. Construction of an access track in the townlands of Breeda and Rearour South to facilitate turbine delivery;*
- viii. Junction improvement works in the townland of Killea to facilitate turbine delivery;*

- ix. 3 no. borrow pits;*
- x. 2 no. temporary construction compounds;*
- xi. Site Drainage;*
- xii. Forestry Felling;*
- xiii. Signage; and*
- xiv. All associated site development works.*

A detailed description of the proposed development is provided in Chapter 4 of this EIAR.

Modern wind turbine generators typically have an output of between 3.0 and 5.2 Megawatts (MW), with increases in efficiency and output predicted to continue into the coming decade. For the purposes of this EIAR it is assumed that the wind turbine model installed as part of the proposed wind farm will have an output of between 3.5 and 5.0 MW. Therefore, based on 17 No. turbines, the proposed wind farm will have a total output between 60 MW and 85 MW.

Need for the Proposed Development

It is now clear that Ireland has not reached its 2020 target for renewable energy. In March 2019, the Government announced a renewable electricity target of 70% by 2030. Ireland faces significant challenges in its efforts to meet EU targets for renewable energy by 2030 and its commitment to transition to a low carbon economy by 2050. Further detail can be found in Section 2.2 of this EIAR.

The proposed development is likely to be operational before 2030 and would therefore contribute to the 2030 renewables target. The EPA reported in July 2020 that Ireland is set to fall far short of all its carbon emissions reduction targets for 2030, despite additional climate action measures including those set out in the National Renewable Energy Action Plan (NREA), the National Energy Efficiency Action Plan (NEEAP), the National Development Plan 2018-2027 and the 2019 Climate Action Plan.

As such, the proposed Lyrenacarriga wind energy development is critical to helping Ireland address these challenges as well as addressing the country's over-dependence on imported fossil fuels.

Purpose and Structure of this EIAR

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

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

- 1. Introduction*
- 2. Background to the Proposed Development*
- 3. Consideration of Reasonable Alternatives*
- 4. Description of the Proposed Development*
- 5. Population and Human Health*
- 6. Shadow Flicker*
- 7. Biodiversity*
- 8. Ornithology (Birds)*
- 9. Land, Soils and Geology*
- 10. Water (Hydrology and Hydrogeology)*
- 11. Air and Climate*
- 12. Noise and Vibration*

13. *Landscape and Visual*
14. *Archaeological and Cultural Heritage*
15. *Material Assets (including Traffic and Transport, Telecommunications and Aviation)*
16. *Interactions of Effects*
17. *Schedule of Mitigation*

Background to the Proposed Development

Chapter 2 of the EIAR presents information on renewable energy and climate change policy and targets, the strategic planning context for the proposed development, a description of the proposed development site and planning history, scoping and consultation undertaken, and the cumulative impact assessment process.

Energy and Climate Change

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

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

Furthermore, the Programme for Government released in June 2020 also highlights the need for a clean and reliable supply of energy:

“Energy will play a central role in the creation of a strong and sustainable economy over the next decade. The reliable supply of safe, secure and clean energy is essential in order to deliver a phase-out of fossil fuels. We need to facilitate the increased electrification of heat and transport. This will create rapid growth in demand for electricity which must be planned and delivered in a cost-effective way.”

The SEAI’s ‘Energy in Ireland 2019’ report provides the most up to date figures available in relation to energy production and consumption in Ireland. The 2019 report found that wind generation accounted for 28.1% (normalised) of all electricity generated, further, wind energy accounted for 84% of the renewable energy generated in 2018. In relation to the findings of this SEAI report it is clear that wind energy represents the strongest and most deployable renewable energy resource available to reduce dependence on fossil fuels in Ireland.

Local Policy

Waterford County Development Plan 2011-2017 (as extended)

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

- **Objective ENV 5**
 - a) *To encourage, where appropriate, proposals for renewable energy developments and ancillary facilities;*

- b) *To promote and facilitate wind energy production in the County in accordance with the County Wind Energy Strategy and the Wind Energy Guidelines (2004) produced by the Department of the Environment, Heritage and Local Government;*
 - c) *To facilitate, where appropriate, the development of small-scale hydroelectric power generation, in particular when developed in combination with other forms of energy infrastructure, such as wind farms; and*
 - d) *To support and encourage the appropriate development of the bio-energy sector and facilitate its development for energy production, heat storage and distribution.*
- ***Policy ENV 10:*** *To facilitate and encourage sustainable development proposals for alternative energy sources and energy efficient technologies.*
 - ***Policy ECD 15:*** *To facilitate appropriate renewable energy infrastructure and promote the use of renewable energy among businesses and households throughout Waterford County.*

Wind Energy Strategy

Waterford County Council adopted a Wind Strategy as a variation to the 2005-2011 County Development Plan, (Appendix (8) of the WCDP 2011-2017 refers), and it provides the basis for a planned approach to wind energy development in Waterford.

- ***Policy ENV 11:*** *To promote and facilitate the sustainable development and use of wind energy in the County and to ensure all wind energy developments comply with the Waterford County Wind Energy Strategy and the DoEHLG guidance document on Wind Energy. Screening for Appropriate Assessment will be carried out where required to ensure that there is no negative impact on the integrity (defined by the structure and function and conservation objectives) of any Natura 2000 site located at or adjacent to a proposed site for wind energy development and that the requirements of Articles 6 (3) and (4) of the EU Habitats Directive 92/43/EEC are fully satisfied. The Planning Authority shall have regard to the possible visual impact of a wind farm development on towns and villages, protected views and amenity areas outside of the administrative area of Waterford County Council in the assessment of wind energy applications.*

The Wind Strategy categorises the County into 4 no. classification areas based on their suitability to harness wind energy while taking into account the sensitivity of the landscape. The classes are summarised as follows:

1. *Strategic Areas*
2. *Preferred Areas*
3. *Areas Open for Consideration*
4. *No-Go Areas*

The part of the proposed development in County Waterford is located within an area designated as a '**Preferred Area**' for wind farm development.

Renewable Energy Strategy for Waterford City & County 2016-2030

The Waterford Renewable Energy Strategy 2016 – 2030 was developed as a planning framework to support and underpin the Core Strategy, policies and objectives of the Waterford County Development Plan 2011-2017 in the context of EU and national renewable energy targets. The Strategy examines the renewable energy potential for the county and considers the strategic planning factors contributing towards the deployment of such renewable energy. The Strategy aims:

“to ensure that Waterford is at the forefront of renewable energy production whilst equally promoting energy efficiency and conservation in all sectors of the economy.”

As such, the Strategic Aims of the Strategy include:

- *To ensure that between now and 2030, there is a steady, progressive and measurable increase in the amount of renewable energy used in the electricity, heat and transport sectors in Waterford, commensurate with the achievement of the national target;*
- *To identify opportunities for various renewable energy technologies and resources appropriate to Waterford; and*
- *To maximise the opportunities for renewable energy development whilst safeguarding the environment and other amenities, subject to Strategic Environmental Assessment and Habitats Directive Assessment requirements.*

It is acknowledged within the Strategy that there is considerable renewable energy resource within Waterford. It is noted that the County has the potential to maximise energy generation by renewable means, which will contribute to a reduction of energy imports, address security of supply issues, provide a secure, indigenous source of energy whilst also keeping wealth within the local economy.

Cork County Development Plan 2014-2020 (as varied)

The Cork County Development Plan 2014-2020 (as varied) (CCDP) sets out a strategic vision and corresponding main aims underpinned by the core principles of sustainability, social inclusion, quality of design and climate change adaptation.

The CCDP acknowledges the key strategic role Cork plays in energy provision in Ireland and recognises that energy generation and energy related activity in Cork is likely to change significantly over the coming years as the move to a low carbon economy increases. The CCDP further emphasises that the development of renewable energy sources is central to overall energy policy in Ireland and a key aim of the Plan is to support the sustainable development of renewable energy sources, as set out in Objective ED 1-1, below.

- ***ED 1-1:** Ensure that through sustainable development County Cork fulfils its optimum role in contributing to the diversity and security of energy supply and to harness the potential of the county to assist in meeting renewable energy targets.*

The CCDP notes that, at the time of publishing the Plan, County Cork had the largest wind energy capacity in the Country with 283 Megawatts (MW) from 20 no. wind farms, which was approximately 13.8% of Ireland's overall wind energy production. It is acknowledged by the CCDP that there is considerable potential for additional wind energy capacity within the County. The Plan identifies, in broad strategic terms, three categories of ‘Wind Deployment Area’ for large scale commercial wind energy developments, this approach facilitates commercial wind energy development in approximately 55% of Cork County with the remaining 45% unlikely to be suitable. These categories summarised as follows:

- *Acceptable in Principle*
- *Open to Consideration*
- *Normally Discouraged*

The part of the proposed development which is located within the functional area of Cork County Council is located within an area designated as ‘**Open to Consideration**’ for wind energy development by the CCDP. The Plan states that this category has been applied to areas with some capacity to absorb wind development, but which are sensitive enough to require a site-by-site appraisal to ascertain the suitability of the area for development.

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

- **ED 3-2:** *On-shore wind energy projects should focus on areas considered ‘Acceptable in Principle’ and Areas ‘Open to Consideration’ and generally avoid “Normally Discouraged” areas in this Plan.*
- **ED 3-3:** *Support a plan led approach to wind energy development in County Cork and identify areas for wind energy development. The aim in identifying these areas is to ensure that there are no significant environmental constraints, which could be foreseen to arise in advance of the planning process.*
- **ED 3-5:** *Commercial wind energy development is ‘Open to Consideration’ in these areas where proposals can avoid adverse impacts on:*
 - *Residential amenity particularly in respect of noise, shadow flicker and visual impact;*
 - *Urban areas and Metropolitan/Town Green Belts;*
 - *Natura 2000 Sites (SPA and SAC), Natural Heritage Areas (NHA’s) or adjoining areas affecting their integrity;*
 - *Architectural and archaeological heritage; and*
 - *Visual quality of the landscape and the degree to which impacts are highly visible over wider areas.*

Wind Energy Development Guidelines

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

The ‘*Wind Energy Development Guidelines for Planning Authorities*’ (DoEHLG, 2006) are currently the subject of a targeted review. The proposed changes to the assessment of impacts associated with onshore wind energy developments are outlined in the document ‘*Proposed Revisions to Wind Energy Development Guidelines 2006 – Targeted Review*’ (December 2013), the ‘*Review of the Wind Energy Development Guidelines 2006 – Preferred Draft Approach*’ (June 2017), and the Draft Wind Energy Development Guidelines (December 2019). A consultation process in relation to the 2019 document concluded on the 19th of February 2020.

At time of writing, the Draft Guidelines have not yet been adopted, and the relevant guidelines remain those published in 2006., Due to the timelines associated with the planning process for renewable energy projects, it is possible that a version of the draft guidelines may be finalised during the consideration period for the current proposed development, this has been taken into account in the design of the wind farm.

Planning History

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

Scoping and Consultation

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

Pre-application consultations were also held with Cork County Council and Waterford City and County Council in which the proposed development was introduced, detailed discussions were held with

regards to the proposed development. Pre-application consultations also took place with An Bord Pleanála as part of the Strategic Infrastructure Development process. The Board’s letter dated the 29th May 2020 confirmed that the proposed development falls within the scope of paragraphs 37A(2)(a) and (b) of the Act. Accordingly, the Board have confirmed that the proposed development would be strategic infrastructure within the meaning of Section 37A of the Planning and Development Act, 2000 (as amended), and that any application for planning permission must therefore be made directly to the Board.

Engagement with the public, local residents and local public representatives took place in many forms during the project design and preparation of the EIAR. A Community Report is presented as Appendix 2-4 of the EIAR, which summaries the community consultation and how it influenced the design of the proposed project.

Consideration of Reasonable Alternatives

This chapter of the EIAR includes a description of the reasonable alternatives studied by the developer which are relevant to the project and its specific characteristics and an indication of the main reasons for the option chosen, taking into account the environmental effects. This chapter of the EIAR addresses alternatives under the following main headings:

- ‘Do Nothing’ Alternative;
- Alternative Locations;
- Alternative Technologies;
- Alternative Turbine Numbers and Model
- Alternative Designs;
- Alternative Grid Connections
- Alternative Transport Routes and Site Access

The ‘Do-Nothing’ scenario has also been assessed, i.e. an outline of what is likely to happen to the environment should the Project not be implemented.

Alternative Locations

The key policy, planning and environmental considerations for the selection of a potential wind farm site included:

- Site location relative to both Waterford County Council and Cork County Council’s Wind Energy Strategy classification of areas considered suitable for wind farm development;
- Low population density
- Protection of visual amenity.
- Located outside areas designated for protection of ecological species and habitats;
- Access to the national electricity grid possible within a viable distance;
- Sufficient area of unconstrained land that could potentially accommodate wind farm development and turbine spacing requirements.

The site was identified for potential development following a detailed desktop screening appraisal, firstly at national level and subsequently at regional and county level of all available sites which met the above criteria as set out in national and local policy with regard to the proposed siting of wind energy developments. Following this screening exercise, the top-ranking sites were selected to progress with further detailed site-specific screening appraisals to determine initial feasibility for a planning application and this process of further review and refinement resulted in the Lyrenacarriga project being selected by the applicant as the optimal site in Waterford and Cork to progress to the next stage of feasibility assessment and early development work.

Alternative Technologies

The proposed wind farm will be located on a site where forestry and agriculture will continue to be carried out around the footprint of the wind farm. Alternative sources of renewable energy considered for the site included solar energy.

Commercial solar energy production is the harnessing and conversion of sunlight into electricity using photovoltaic arrays (panels). To achieve the same electricity output, as is expected from the proposed wind energy development (up to 85 MW) from solar energy would require a significantly larger development footprint and the permanent felling of a significantly larger area of commercial forestry. The proposal for a wind energy development at this site was considered to be the most efficient method of electricity production with the lesser potential for significant environmental effects.

Alternative Turbine Numbers and Model

The proposed wind turbines will each have a potential power output of between 3.5 and 5.0 MW. It is proposed to install 17 turbines at the site which could achieve in the range of 60 to 85 MW total output. Theoretically, such a wind farm could also be achieved on the proposed site by using smaller turbines (for example 2.3 MW turbine models). However, this would necessitate the installation of 35 turbines to achieve a similar output. Furthermore, the use of smaller turbines would not make efficient or economically viable use of the wind resource available having regard to the nature of the site.

The 17-turbine layout selected for the site has the smallest development footprint of the other alternatives considered, while still achieving the optimum output at a more economical level than would be achievable using different turbines.

Alternative Designs

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

Throughout the preparation of the EIAR, the layout of the proposed development has been revised and refined to take account of the findings of all site investigations, which have brought the design from its first initial layout to the current proposed layout that is the subject of this application for planning permission. The design process has also taken account of the recommendations and comments of the relevant statutory and non-statutory consultees, the local community and local authorities, as detailed in Section 2.6 of Chapter 2.

The development of the final proposed wind farm layout has resulted following feedback from the various studies and assessments carried out, as well as ongoing consultation, feedback collection and discussions with landowners and the local community, as described above. As information regarding the site was compiled and assessed, the number of turbines and the proposed wind farm layout were revised and amended to take account of these findings. The EIAR and wind farm design process was therefore an iterative process, where findings at each stage of the assessment were used to further refine the design, always with the intention of minimising the potential for environmental impacts. Where changes were made to the proposed turbine layout during the design process, these updates were circulated to the project team on ongoing basis and assessed to ensure they would not give rise to adverse environmental impacts.

The initial constraints study identified a significant viable area within the site, in which turbines could potentially be located. From here, the proposed turbine layout went through 11 separate iterations

during optimisation of the site design. A comparison of the potential environmental effects of the previous alternative layouts versus the final proposed layout is presented in Chapter 3.

The proposed development encompasses ancillary infrastructure required for the wind farm, including construction compounds, electricity substation and borrow pits. These features formed part of the project design from the outset, and were taken into consideration during the constraints mapping, site design and site assessment stages, as described Chapter 3.

Alternative Grid Connections

The output of the proposed wind farm is such that it requires to connect to a 110 kV substation. The proposed wind farm will connect to the 110 kV overhead line, which traverses the site. This connection method was considered the most suitable for the proposed wind farm due to the long distance associated with alternative routes required to connect to existing offsite substations.

Alternative Transport Routes and Site Access

Wind turbine components (blades, nacelles and towers) are not manufactured in Ireland and therefore must be imported from overseas and transported over land to the site of a proposed development. With regard to the selection of a transport route to the proposed development site, alternatives were considered in relation to turbine components, general construction-related traffic, and site access locations. Turbines will be delivered to the site of the proposed development from Waterford via the N25 towards Youghal and from here onto the R634 Regional Road. This route makes optimum use of the National road network.

Description of the Proposed Development

The layout of the Proposed Development has been designed to minimise the potential environmental effects of the wind farm, while at the same time maximising the energy yield of the wind resource passing through the site. A constraints study, as described in Section 3.6.1 of this EIAR, has been carried out to ensure that turbines and ancillary infrastructure are located in the most appropriate areas of the site. The Proposed Development layout makes maximum possible use of the existing access roads and tracks within the site.

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

Wind Turbines

The proposed wind farm will encompass 17 No. turbines with a maximum ground to blade tip height of up to 150 metres. Within this size envelope, various configurations of hub height, rotor diameter and ground to blade tip height may be used. For the purposes of this EIAR, various types and sizes of wind turbines within the 150-metre tip height envelope have been selected and considered in the relevant sections of the EIAR to assess the worst-case scenario. Turbine design parameters have a bearing on the assessment of shadow flicker, noise, visual impact, traffic and transport and ecology (specifically birds). In each EIAR section that requires the consideration of turbine parameters as part of the impact assessment, the worst-case turbine design parameters that have been used in the impact assessment are specified.

Each wind turbine is secured to a reinforced concrete foundation that is installed below the finished ground level.

Assuming a minimum installed capacity of 60 MW, the Proposed Development has the potential to produce approximately 183,960 MWh (megawatt hours) of electricity per year. This would be sufficient to supply 43,800 Irish households with electricity per year, based on the average Irish household using 4.2 MWh of electricity.

Site Roads

The Proposed Development makes use of the existing forestry road network insofar as possible. It is proposed to upgrade approximately 10.7 kilometres of existing site roads and tracks, and to construct 4.1 kilometres of new access road on the site, plus 0.3 kilometres of temporary new access road on the turbine delivery route.

Borrow Pits

It is proposed to develop three on-site borrow pits as part of the Proposed Development. It is proposed to obtain the majority of all rock and hardcore material that will be required during the construction of the proposed development from the on-site borrow pits. Usable rock may also be won from other infrastructure construction including the substation and the turbine base excavations. Following removal of the rock from a borrow pit, it is proposed to partially restore the borrow pit by storing excavated spoil generated from construction activities.

Electricity Substation and Grid Connection

It is proposed to construct a 110 kV electricity substation within the site. The proposed substation site is located within an area of forestry adjacent to an existing access road. The proposed substation compound will include the substation control building, a switchgear room, and a battery storage compound and control room.

It is proposed to connect to the National Grid from the onsite substation via a 110 kV loop-in connection to the existing 110kV overhead line which runs through the site. This will entail the construction of two sections of approximately 40 metres of overhead line to connect the substation to the existing overhead line, via two angle masts (13 metres in height).

Site Cabling

Each turbine will be connected to the on-site electricity substation via an underground 20 or 33 kV (kilovolt) electricity cable. Fibre-optic cables will also connect each wind turbine to the wind farm control building in the onsite substation compound. The electricity and fibre-optic cables running from the turbines to the onsite substation compound will be run in cable ducts approximately 1.3 metres below the ground surface, along the sides of roadways.

It is proposed to connect the two sections of the site via underground cabling located within existing agricultural land and within the public road corridor. This collector cabling route measures approximately 3.3 km.

Meteorological (Met) Mast

One permanent meteorological (met) mast is proposed. The met mast will be equipped with wind monitoring equipment at various heights. The mast will be a self-supporting slender structure up to 112 metres in height.

A proposed welfare and storage one-storey building will be located adjacent to the met mast. This building will comprise space for parts storage, and welfare facilities for use by maintenance staff.

Temporary Construction Compounds

Two temporary construction compounds are proposed as part of the proposed development. The construction compounds will consist of temporary site offices, staff facilities and car-parking areas for staff and visitors. Temporary port-a-loo 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 transported off site via tankers by an appropriately consented waste collector to wastewater treatment plants.

Tree Felling and Replanting

A total of 45.6 hectares of forestry is required to be permanently felled within and around the footprint of the Proposed Development. The tree felling activities required as part of the Proposed Development will be the subject of a Felling Licence application to the Forest Service, in accordance with the Forestry Act 2014 and the Forestry Regulations 2017 (SI 191/2017) and as per the Forest Service's policy on granting felling licenses for wind farm developments. The policy requires that a copy of the planning permission for the wind farm be submitted with the felling licence applications; therefore, the felling licenses cannot be applied for until such time as planning permission is obtained for the Proposed Development.

In line with the Forest Service's published policy on granting felling licences for wind farm developments, areas cleared of forestry for turbine bases, access roads, and any other wind farm-related uses will have to be replaced by planting at an alternative site. The replacement of the felled forestry can occur anywhere in the State subject to licence. A potential replanting site has been identified in County Sligo with an approved area for planting of 49.9 hectares. These lands have been granted Forest Service Technical Approval for afforestation, and these or similarly approved lands will be used for replanting should the proposed wind farm receive planning permission. A description of the proposed replanting lands and an assessment of the potential impacts including cumulative impacts associated with afforestation at this location are provided in Appendix 4-3 of this EIAR.

Site Activities

All proposed activities on the site of the Proposed Development will be provided for in an environmental management plan. A Construction and Environmental Management Plan (CEMP) has been prepared for the Proposed Development and is included in Appendix 4-4 of this EIAR. The CEMP sets out the key environmental considerations to be taken into account by the contractor during construction of the proposed development. The CEMP also details the mitigation measures to be implemented in order to comply with the environmental commitments outlined in the EIAR. The contractor will be contractually obliged to comply with all such measures. The CEMP also includes a Waste Management Plan and Emergency Response Plan.

In the event planning permission is granted for the Proposed Development, the CEMP will be updated prior to the commencement of the development, to address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned and will be submitted to the Planning Authority for written approval.

Turbine and Construction Materials Transport Route

From Waterford, the turbines will be transported southwest along the N25 National Primary Road for approximately 30 kms to a roundabout just north of Youghal. The route then travels northwest on the R634 Regional Road to the proposed access to the eastern cluster, situated on the eastern side of the R634. Approximately 3 kms to the south on the R634 Regional Road there is a fork in the road, with the road heading northwest on the L7806. This road provides access to the western site approximately 6 kms to the northwest of the junction with the R634.

Works are proposed at two locations on the turbine delivery route as part of the proposed development. Minor road widening is proposed on the southeast corner of Lombard's Cross Roads. A section of access road measuring approximately 300 metres in length is proposed off the local road L7806 near Breeda Bridge, in order to allow the turbine delivery vehicles to avoid a bend in the public road and to avoid the removal of mature roadside trees at this location. The proposed road will be constructed on agricultural land.

Community Benefit Fund

Should Lyrenacarriga Wind Farm be consented, it has the potential to provide significant additional investment into community projects that will benefit local residents and businesses. Following the publication of the Department of Communications, Climate Action & Environment's (DCCAE) Renewable Energy Support Scheme (RESS) and the outcome of the first auction under the scheme, RESS1 which took place in August 2020, it is anticipated that based on the requirement for all wind energy projects to contribute €2 per MWh of output, a community fund in the region of €6,000 per MW of installed capacity per annum could be available from the proposed wind farm.

This means that a wind farm at Lyrenacarriga of 60 MW to 85 MW capacity could result in a fund upward of €360,000 per year for the local community, subject to the final installed capacity (MW) and output (MWh) of the wind farm. This represents a dependable source of income for the communities local to Lyrenacarriga.

Site Drainage

The drainage design for the Proposed Development has been prepared by Hydro Environmental Services Ltd. (HES). The drainage design has been prepared based on the extensive experience of the project team of afforested wind farm sites, and the number of best practice guidance documents referred to in the References section of the EIAR.

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

Drainage water from any works areas of the site of the Proposed Development will not be directed to any natural watercourses within the site. Two distinct methods will be employed to manage drainage water within the site. The first method involves keeping clean water clean by avoiding disturbance to natural drainage features, minimising any works in or around artificial drainage features, and diverting clean surface water flow around excavations and construction areas. The second method involves collecting any drainage waters from works areas within the site that might carry silt or sediment, to allow attenuation and settlement prior to controlled diffuse release.

The drainage design is intended to maximise erosion control, which is more effective than having to control sediment during high rainfall. Such a system also requires less maintenance. The area of exposed ground will be minimised. The drainage measures will prevent runoff from entering the works

areas of the site from adjacent ground, to minimise the volume of sediment-laden water that has to be managed. Discoloured run-off from any construction area will be isolated from natural clean run-off.

Construction Sequencing

It is estimated that the construction phase of the Proposed Development will take approximately 18-24 months from commencement onsite to the commissioning of the electrical system. The construction phase can be broken down into three main phases, which overlap partially: 1) site preparation and civil engineering works - 10 months, 2) electrical works - 12 months, and 3) turbine erection and commissioning - 8 months.

Operation

Planning permission is being sought for a 30-year operation period commencing from the date of full operational commissioning of the wind farm. During the operational period, on a day-to-day basis the wind turbines will operate automatically, responding by means of anemometry equipment and control systems to changes in wind speed and direction.

The wind turbines will be connected and data relayed to an off-site control centre. Each turbine will also be monitored off-site by the wind turbine supplier. The monitoring of turbine output, performance, wind speeds, and responses to any key alarms will be monitored at an off-site control centre 24-hours per day.

Each turbine will be subject to a routine maintenance programme involving visits to undertake a number of checks and changing of consumables, including oil changes.

Decommissioning

Following the end of their useful life, the wind turbines may be replaced with a new set of turbines, subject to fulfilment of planning requirements at that time, or the Proposed Development may be decommissioned fully. The onsite substation will remain in place as it will be under the ownership of the ESB/EirGrid and will form a permanent part of the electricity grid.

Upon decommissioning of the Proposed Development, the wind turbines would be disassembled in reverse order to how they were erected. All above ground turbine components would be separated and removed off-site for recycling. Turbine foundations would remain in place underground and would be covered with earth and reseeded as appropriate. Leaving the turbine foundations in-situ is considered a more environmentally prudent option, as to remove that volume of reinforced concrete from the ground could result in significant environment nuisances such as noise, dust and/or vibration. Site roadways will be left in situ, as appropriate. If it were to be confirmed that the roads were not required in the future for any other useful purpose, they could be removed where required. Underground cables, including grid connection, will be removed and the ducting left in place. A decommissioning plan will be agreed with the local authorities three months prior to decommissioning the Proposed Development.

Population and Human Health

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

The proposed wind farm site is located approximately 5 kilometres southeast of Tallow, Co. Waterford and approximately 15 kilometres to the northwest of Youghal, Co. Cork, in which the main services are located. Additionally, the nearby settlement of Inch lies approximately 3.8 kilometres south of the proposed development site, where local amenities including a community centre, church and shop are located. There are no key identified tourist attractions pertaining specifically to the site of the proposed development itself.

Information regarding population and general socio-economic data were sourced from the Central Statistics Office (CSO), the Cork County Development Plan 2014– 2020, Waterford County Development Plan 2011– 2017 (as extended) and Fáilte Ireland. The study included an examination of the population and employment characteristics of the area. This information was sourced from the Census of Ireland 2016, which is the most recent census for which a complete dataset is available, also the Census of Ireland 2011, the Census of Agriculture 2010 and from the CSO website, www.cso.ie. Census information is divided into State, Provincial, County, Major Town and District Electoral Division (DED) level.

The Study Area for the Population section of this EIAR is defined in terms of the District Electoral Divisions (DEDs) in which the proposed wind farm site is located, as well as adjacent DEDs which have the potential be affected by the proposed development. The site of the proposed wind farm lies within the Kilconat, Tallow, Kilwatermoy West, Ardagh and Templemichael DEDs. Adjacent DEDs include Kilcockan, Kilwatermoy East and Curraghlass DED. This Study Area has a combined population of 3,445 persons, as of 2016 (the latest Census data available), and comprises a total land area of 17,710 hectares or 177.1 square kilometres (km²). (Source: CSO Census of the Population 2016).

There are 51 dwellings located within one kilometre of the proposed turbine locations (plus one application for a dwelling, currently at Planning stage). The closest occupied dwelling is located approximately 700 metres from the nearest proposed turbine location. The proposed development achieves a minimum set back distance of four times the turbine tip height plus an additional 100 metres between proposed turbine locations and any residential property.

There is currently no published credible scientific evidence to positively link wind turbines with adverse health effects. The main publications supporting the view that there is no evidence of any direct link between wind turbines and health are summarised in Chapter 5 of this EIAR.

Although there have been no empirical studies carried out in Ireland on the effects of wind farms on property prices, it is a reasonable finding based on the available international literature that the provision of a wind farm at the proposed location would not impact on the property values in the area.

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

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

Economic Benefits

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

Commercial rate payments from the proposed project will be provided to Cork and Waterford County Councils each year, which will be redirected to the provision of public services within Counties Cork and Waterford. 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 will create up to 100 jobs during the construction phase and 2-3 jobs during the operational and maintenance phases of the proposed development. During construction, additional employment will be created in the region through the supply of services and materials to the development. In addition to this, there will also be income generated by local employment from the purchase of local services i.e. travel and lodgings.

Shadow Flicker

Shadow flicker is an effect that occurs when rotating wind turbine blades cast shadows over a window in a nearby property. Shadow flicker may be experienced by an occupant sitting in an enclosed room when sunlight reaching the window is momentarily interrupted by a shadow of a wind turbine's blade. Shadow flicker effect lasts only for a short period of time and happens only in certain specific combined circumstances. The current *Wind Energy Development Guidelines for Planning Authorities* (DoEHLG, 2006) recommend that shadow flicker at neighbouring dwellings within 500 metres of a proposed turbine location should not exceed a total of 30 hours per year or 30 minutes per day. There are no dwellings located within 500 metres of the proposed turbines, nevertheless the relevant thresholds have been used as part of this assessment.

Shadow flicker assessments are typically undertaken for properties located within ten rotor diameters of proposed turbine locations. At distances greater than ten rotor diameters from a turbine, the potential for shadow flicker is very low (DoEHLG, 2006). As the maximum potential rotor diameter of the proposed Lyrenacarriga turbines measures 133 metres, a study area of 1,330 metres has been used in this assessment to determine the potential for shadow flicker by the proposed development on properties in the surrounding environs. A total of 93 dwellings fall within this 1,330m study area with the nearest proposed turbine being approximately 700m from the nearest dwelling.

The potential flicker that will occur at houses located within the area surrounding the proposed development was calculated using the ReSoft WindFarm software package. Of the 93 No. residential properties modelled and applying the regional sunshine average, it is predicted that 4 No. properties may experience shadow flicker in excess of the 2006 DoEHLG guideline threshold of 30 hours per year. However, this prediction does not consider wind direction or screening provided by intervening vegetation and topography.

Where shadow flicker exceedances of the 30-minute per day threshold are experienced, suitable mitigation measures as outlined in Chapter 6 will be employed at the potentially affected properties to ensure that the current adopted 2006 DoEHLG daily and annual guidelines are complied with. The same mitigation strategies also demonstrate that the proposed Lyrenacarriga Wind Farm can be brought in line with the shadow flicker requirements of the Draft Revised Wind Energy Development Guidelines (2019) should they be adopted while this application is in the planning system.

Biodiversity

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

Multidisciplinary walkover surveys were undertaken on the 31st August 2018, 05th October 2018, 26th of September 2019, 29th May 2020 and 19th November 2020. Additional incidental species sightings were also recorded during dedicated bird surveys of the site between 2016 and 2018. The majority of

the survey timings fall within the recognised optimum period for vegetation surveys/habitat mapping, i.e. April to September (Smith et al., 2011). A comprehensive walkover of the entire site was completed with incidental records also incorporated from other dedicated species/habitat specific surveys including otter, bats, marsh fritillary or quadrat surveys.

The habitats on the site of the Proposed Development were the subject of a detailed survey and assessment. This habitat mapping and assessment was undertaken following with ‘*A Guide to Habitats in Ireland*’ (Fossitt, 2000). The majority of the study area is dominated by plantation forestry, comprising mainly of Sitka spruce (*Picea sitchensis*) and Lodgepole pine (*Pinus contorta*) as well as large plantations of Eucalyptus (*Eucalyptus sp.*). The site is accessible via a network of existing forestry access tracks and forestry rides. The remainder of the wind farm infrastructure site is dominated by Improved agricultural grassland (habitat code GA1) and Arable crops (BC1). The collector cabling route between the turbine clusters is also predominantly located within Improved agricultural grassland (GA1) and existing roads.

The majority of the proposed wind farm infrastructure is located within Conifer plantation (WD4) habitat which includes Turbines T1, T2, T5, T8, T9, T10, T11, T12, T13, T15 and T17, the temporary construction compounds, borrow pits and new site roads. Part of the proposed development infrastructure is located Improved agricultural grassland (GA1) habitat including turbines no. T3, T14 and T16, as well as their associated infrastructure i.e. site access road, hardstand and blade set-down area. Some of these areas are subject to changes in agricultural management and have also been planted with Arable crops in some years (BC1).

There will be some loss of seminatural habitats as a result of the proposed development footprint. The proposed development will result in a short-term loss of 0.02 hectares (ha) of wet willow-alder-ash woodland. This will be replaced with an area of 0.06ha of young wet woodland at a nearby location in order to offset this loss. The proposed development will result in the loss of approximately 236 metres of hedgerow as a result of the proposed development. In order to offset for the loss of hedgerow and treeline habitat to the proposed development (predominantly associated with bat mitigation measures), it is also proposed to plant 236 linear metres of new hedgerow within large areas of agricultural/arable lands to increase connectivity locally. There will therefore be no net loss in hedgerow or treeline habitat.

No significant effects on surface water quality, groundwater quality or the hydrological/ hydrogeological regime were identified during either construction, operation or decommissioning phases of the proposed development.

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

Ornithology (Birds)

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

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

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

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

Land, Soils and Geology

The geology of the wind farm site predominately comprises glacial subsoil (overburden) deposits overlying sandstone and siltstone bedrock. Numerous trial pits (27 no.) were undertaken to investigate the overburden type and depth to bedrock at the site. There is also some localised peat near the western boundary of the eastern cluster of turbines, but not in any areas proposed for development.

Varying depths (0.8 to 4.0mbgl) of overburden were encountered at all trial pits excavated at the wind farm site. Bedrock encountered during the trial pit investigation comprised of weathered siltstone and sandstone. Based on the Geotechnical Assessment there is no evidence of past slope failures nor were there any signs of instability noted on the proposed development site.

Construction of the wind farm infrastructure will require the removal of soil, subsoil and rock to competent foundation. Excavation of bedrock from the proposed on-site borrow pits (3 no.) will provide material for access road, turbine bases and general hard-standing construction. Removal of soil, subsoil and bedrock represents a permanent direct impact on the geology of the site which is considered to be an acceptable part of economic progression and development.

Excavated spoil will be utilised to re-instate the borrow pit locations (3 No.) and a portion of the excavated spoil will also be used for reinstatement and landscaping works around the wind farm site or side cast at designated areas. Overburden excavated along the grid connection route will be reinstated. The handling, management and storage of spoil will be undertaken in accordance with the Geotechnical Assessment Report, included as Appendix 4-2 of this EIAR.

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

There are no recorded Geological Heritage sites, mineral deposit sites, or mining sites (current or historic) within 5 km of the wind farm site.

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

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

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

Water

The Proposed Development is located in the Blackwater River surface water catchment. The Blackwater River catchment is in the South Western River Basin District (SWRBD).

The Proposed Development site consists of two separate clusters of turbines. The turbine clusters are referred to herein as the western and eastern clusters.

In terms of local hydrology and drainage, the northern part of the western cluster and the north-eastern tip of the eastern cluster are located in the River Bride surface water sub-catchment. The remainder of western and eastern clusters are located in the Tourig River and Glendine River surface water sub-catchments respectively. There is 1 no. proposed turbine in the River Bride sub-catchment, 5 no. turbines in the Tourig River sub-catchment and 11 no. in the Glendine River sub-catchment.

The eastern cluster is drained by a relatively dense network of mainly first and second order streams, many of which are headwater streams of the Glendine River. One headwater stream emerges from the west and also from the south of the eastern cluster which flow towards the Tourig River. Due to the slightly more elevated nature of the western cluster and the steeper sloping topography, the natural stream density is relatively low compared to the eastern cluster area.

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

With regard flood risk, no recurring flood incidents within the Proposed Development site boundary or immediately downstream were identified from OPW's flood hazard mapping. The proposed turbine locations, compounds, substation or borrow pits are not located within any OPW mapped fluvial flood zone.

There are two public surface water supplies downstream of the Proposed Development site, the Tallow Public Water Supply and the Youghal Public Water Supply. There is no proposed development in the surface water catchment to the Tallow Public Water Supply which is from the Kilbeg Stream. The Youghal PWS has 2 no. surface water abstraction points on the Glendine River and 1 no. surface water abstraction point on the Tourig River. The Glendine Gravity Intake is 2km upstream of the Glendine Pumped Intake with the downstream distance from eastern landholding being 1 and 3km respectively. The Tourig River abstraction point is located approximately 11km downstream of the western cluster. A comprehensive surface water management plan and drainage plan has been prepared for the Proposed Development and this will ensure that surface water runoff from the developed areas of the site will be of a high quality and will therefore not impact on the quality of downstream rivers and related surface water abstractions.

The bedrock underlying the site is classified as locally important in terms of groundwater well yield (volume) potential. Groundwater at the site can be classed as sensitive in terms of potential impacts from the proposed development. The preferential for surface water runoff makes surface water bodies such as streams more sensitive to pollution than groundwater at this site. There will be no impact on private wells as there are no wells located down-gradient of the proposed works.

Designated sites that receive surface water runoff from the proposed wind farm development include the Blackwater River (SAC and NHA). Designated sites can be considered very sensitive in terms of potential impacts. Comprehensive surface water mitigation and controls are proposed to ensure protection of all downstream receiving waters. Any introduced drainage works at the site will mimic the existing drainage regime thereby avoiding changes to flow volumes leaving the site.

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

Two methods will be employed to control drainage water within the site during construction, thereby protecting downstream surface water quality and aquatic habitats. The first method involves ‘keeping clean water clean’ by avoiding disturbance to natural drainage features, minimising any works in or around artificial drainage features, and diverting clean surface water flow around excavations and construction areas. The second method involves collecting any drainage waters from works areas within the site that might carry silt, to allow settlement and cleaning prior to its release. During the construction phase all runoff will be treated to a high quality prior to being released. There will be no risk of increased flooding down-gradient of the site as a result of the proposed development due to these drainage measures. Impacts on water quality during the construction phase of the wind farm will be imperceptible to none. A surface water monitoring programme will be put in place during the construction phase.

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

There will be no change to the existing Water Framework Directive (WFD) status of local watercourses (surface water bodies) or groundwater bodies as a result of the construction or operation of the Proposed Development.

In terms of cumulative hydrological effects arising from all elements of the Proposed Development and other wind farms, no significant effects are will occur and this is largely due to the relatively low turbine density in the Blackwater River surface water catchment.

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

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

Air and Climate

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

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

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

These zones were defined to meet the criteria for air quality monitoring, assessment and management described in the Clean Air for Europe (CAFE) Directive (as amended) and the Fourth Daughter

Directive. The site of the proposed development lies within Zone D, which represents rural areas located away from large population centres.

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

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

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

Climate Change and Carbon Balance Calculations

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

The Environmental Protection Agency (EPA) publishes Ireland’s Greenhouse Gas Emission Projections with the most recent report, ‘Ireland’s Greenhouse Gas Emissions Projections 2019 –2040’ published in July 2020. The report includes an assessment of Ireland’s progress towards achieving its emission reduction targets out to 2030 will result in a reduction in Ireland’s total greenhouse gas emissions by up to 23% only with the full and early implementation of the 2019 Climate Action Plan.

The EPA Emission Projections notes the following key trends:

- *Ireland is set to miss its target for compliance with the EU’s Effort Sharing Decision (Decision No 406/2009/EC). Ireland is projected to meet non-ETS EU targets over the period 2021 to 2030. This assumes full implementation of the 2019 Climate Action Plan and the use of flexibilities in relation to land use, land use change and forestry.*
- *Full and early implementation of the 2019 Climate Action Plan is needed if the savings projected are to materialise. The scale and pace of the changes needed are significant, requiring much greater reliance on renewables, cross-cutting measures such as an €80 per tonne of CO₂ carbon tax by 2030 and further ambitious measures in sectors such as transport, agriculture and power generation;*
- *A 70% contribution of renewable energy in electricity generation by 2030 will be achieved by approximately tripling the 2018 renewable generation capacity, while phasing out coal and peat use. Increased renewables, and greater interconnection, are projected to result in energy industries emissions decreasing by over 34% by 2030 compared to the most recent figures in 2018.*

This chapter of the EIAR calculates the carbon savings associated with the proposed wind farm development. In total, it is estimated that **2,429,706** tonnes of carbon dioxide will be displaced over the proposed thirty-year lifetime of the Proposed Development.

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

Noise and Vibration

AWN Consulting Limited carried out the assessment of likely environmental noise and vibration impacts of the proposed Lyrenacarriga wind farm development.

The background noise environment has been established through noise monitoring surveys undertaken at several noise sensitive locations (NSLs) surrounding the Proposed Development. Typical background noise levels for day and night periods at various wind speeds have been measured in accordance with best practice guidance contained in the Institute of Acoustics document ‘*A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise*’ (IoA GPG). Prevailing noise levels are primarily attributable to local road traffic noise and other agricultural and anthropogenic sources in the area. The results of the background noise survey have been used to derive appropriate noise criteria for the development in line with the guidance contained in ‘*Wind Energy Development Guidelines for Planning Authorities 2006*’.

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

The assessment of construction 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 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 well below recommended significance threshold values. The associated construction noise and vibration impacts are not expected to cause any significant effects. However, there are two NSLs within 30m of the proposed construction of internal roads and existing road upgrade works that exceed the significance threshold values based on a worst-case scenario. As these works progress along the route the worst-case predicted impacts will reduce. It is envisioned that the works would be at the closest position to the two nearest NSLs for no more than 2 to 3 days.

Based on detailed information on the site layout, the likely turbine noise emissions and turbine hub height for the proposed development, a series of ‘worst-case’ turbine noise prediction models have been prepared for review. The predicted turbine noise levels have been calculated at all NSLs in accordance with the Institute of Acoustics (IOA) *Good Practice Guide* recommendations. The predicted turbine noise levels associated with the Proposed Development in isolation are predicted to be well within the best practice noise criteria curves recommended in Irish guidance document ‘*Wind Energy Development Guidelines for Planning Authorities 2006*’ in all cases. Therefore, it is not considered that a significant effect is associated with the Proposed Development.

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

In summary, the noise and vibration impact of the proposed development is not significant considering national guidance for wind farm developments.

Landscape and Visual

The proposed Lyrenacarriga development is located upon an elevated plateau (approximately 203 m O.D. (Ordnance Datum) in the north to approximately 125 m O.D. in the most south-easterly corner.

In the wider landscape, there are some hills up to 235 m O.D. to the south-west of the western landholding. To the north the land slopes down gradually to the River Bride and to the east towards the Blackwater River.

The majority of the proposed development site is currently used for commercial forestry with some pockets used for agriculture. Land-use in the wider landscape comprises a mix of agriculture, low density residential development and commercial forestry.

Using the landscape types in the Wind Energy Planning Guidelines (DoEHLG, 2006), '*Hilly and Flat Farmland*' best describes the proposed site and the LCA in which the site is located.

Of the 12 landscape character areas identified in the study area, three were screened out at the pre-assessment stage as they will experience no or very minor visibility of the proposed turbines. The two landscape character areas in which the turbines will be located, Co. Waterford prov. LCA 1 *South-Western Upland Plateau* and Co. Cork LCT 10b *Fissured Fertile Middleground*, the landscape effects are considered 'Moderate' and 'Not Significant' respectively.

Mitigating factors that contributed to this assessment found that for Co. Waterford prov. LCA1 full theoretical visibility is mainly restricted to areas classed as 'Preferred Areas' on the Waterford Wind Energy Strategy Map and that there is widespread screening by forestry and roadside vegetation. Co. Cork LCT 10b covers a vast area and stretches to approximately 61 kilometres westwards of the nearest turbine, therefore, the magnitude of change on the LCT is considered 'Slight'.

It is considered that overall, LCT 10b *Fissured Fertile Middleground*, where the turbines are proposed to be built, will change from status 1 to status 2, resulting in 'Medium' cumulative landscape effects. All the other landscape character areas will experience 'Low' cumulative landscape effects. Hence, the overall cumulative landscape effects will be 'Imperceptible' and will only change in the LCT in which the turbines are proposed.

The Zone of Theoretical Visibility (ZTV) map shows many areas that will have no visibility of the proposed turbines throughout the 20-kilometre study area. The most significant of these are the lowlands in the wide Blackwater and Bride River Valleys, an area around and to the north of the N25, and a large area surrounding the Owennacurra and Templebodan Rivers.

Within five kilometres, higher ground partially screens the turbines from many areas and fully at the periphery of the 5-kilometre radius from the turbines. Extensive areas of forestry and road-side screening provide additional screening as illustrated by the route screening analysis.

Photomontages were prepared for a total of 15 viewpoints. The photomontages and wireframes also illustrate cumulative effects with other wind farms. The visual assessment concluded that residual visual effects of 'Moderate' was deemed to arise at three of the 15 viewpoint locations. All other viewpoints were assessed resulting in 'Slight' (5) or 'Not Significant' (7) residual visual effects.

The area that the proposed turbines are to be located has been designated as 'Open to Consideration' in County Cork and 'Preferred' in County Waterford, with regard to wind farm development. Hence, turbines in this landscape are not inappropriate as long as the design and local siting of these turbines is seen to be appropriate.

No designations apply to the site within the County Cork portion of the proposed development. Within Co. Waterford the Scenic Landscape Evaluation shows small areas of 'Sensitive' and a linear area of 'Visually Vulnerable' within the proposed development site. However, areas classed as sensitive within the site do not comply with the description set out in Appendix A9 of the CDP in terms of their character or vegetation cover. The skyline that is shown on the Scenic Landscape Evaluation as 'Visually Vulnerable' was found not to be particularly distinctive relative to the surrounding topography.

Particular attention was given to the Co. Cork Scenic Route S45 on the R634 regional road passing between the two proposed turbine clusters. Viewpoints were attempted to various locations along the scenic route, but due to limited visibility only one was selected. At this viewpoint, Viewpoint 7, which is located between the two turbine groups on a scenic route and only 0.67 kilometres from the nearest turbine, the visual effects are considered ‘Slight’, due to extensive screening of much of the turbines.

Two of the locations where ‘Moderate’ visual effects are expected are within approx. 2 kilometres of the proposed turbines and the third is approx. 3.7 km away. While due to extensive screening only a ‘Slight’ residual effect will occur at two other locations within 2 kilometres. Hence, overall, the visual effects are deemed to be ‘Slight’ for the visual study area as a whole.

Due to the lack of cumulative wind projects in the 20-kilometre visual study area and their distance from the proposed turbines, cumulative visual effects only arose in two of the 15 viewpoints, Viewpoints 11 and 15. In both cases the cumulative effects were considered ‘Negligible’ primarily due to the distance between the wind energy developments. The overall cumulative visual effects will be ‘Imperceptible’.

Archaeology and Cultural Heritage

The archaeological and cultural heritage chapter has been prepared by Tobar Archaeological Services. The assessment is based on both a desktop review of the available cultural heritage and archaeological data and a comprehensive programme of field walking of the study area. An assessment of potential impacts is presented, and a number of mitigation measures are recommended where appropriate. The visual impact of the proposed development on any newly discovered monuments/sites of significance as well as known recorded monuments is also assessed.

The assessment of the archaeology, architecture and cultural heritage of the Proposed Development area included GIS mapping, Viewshed Analysis, desk-based research followed by field inspection. The Viewshed tool uses the Elevation Analysis to determine which areas are visible from specified observer points (the observer points being the monuments). This tool was utilised to ascertain the potential/theoretical visual effects of the proposed turbines on Cultural Heritage Assets. The results show the worst-case scenario since the model does not take trees or vegetation into consideration.

An assessment of all National Monuments in State Care and those subject to Preservation Orders within 10km of the proposed turbines was undertaken to ascertain any potential impacts on their visual setting. Four such monuments are located within 10km of the nearest proposed turbine. The viewshed analysis shows that there are no instances where the proposed turbines could potentially be seen from the National Monument No. 330, Preservation Order 37/1934, Kiltera Ogham Stones at Dromore. The Zone of Theoretical Visibility used in Chapter 12 of this EIAR also shows that this monument is located in an area where no turbines would be visible. The viewshed analysis shows that there are no instances where the proposed turbines could potentially be seen from the National Monument No. 240, Conna Castle. The Zone of Theoretical Visibility used in the LVIA Chapter 12 also shows that this monument is located in an area where no turbines will potentially be visible. The viewshed results show that only four turbines T8-T11 may potentially be seen from National Monument No. 286, North Abbey Dominican Friary, Youghal approximately mid shaft to blade tip from this monument. The remainder of the turbines may not be visible from this location. The viewshed analysis shows that theoretically there are no instances where the proposed turbines may be seen from the National Monument No. Preservation Order 16/1933, Tower House at Kilnatoora.

Three recorded monuments subject to statutory protection as defined in the Record of Monuments and Places or Sites and Monument Record are located within or on the EIAR site boundary for the Proposed Development. Their original setting is now much altered and obscured by dense overgrowth and forestry and the descriptions of the monuments in the Archaeological Inventory Series suggests that the monuments may no longer be extant. The site inspection of the monuments undertaken as part of the EIAR also failed to locate the monuments. The impact on setting is considered to be imperceptible

given their inaccessible and overgrown nature as well as lack of surface trace. Direct effects on the monuments are proposed to be mitigated by the use of buffer zones to be established by an archaeologist prior to construction.

One hundred and seventy (170) recorded monuments are located within 5km of the nearest proposed turbines none of which will be directly impacted. They are included in the ELAR for purposes of assessing potential visual effects on setting. No built heritage structures which are subject to statutory protection or otherwise are located within the ELAR site boundary. Built heritage structures within 5km of the nearest proposed turbines were also considered in terms of potential effects on setting. The Zone of Theoretical Visibility suggests that 13-17 turbines may be visible from the majority of locations where RMPs/RPS and NIAH structures are located within 5km from the proposed Turbines. This impact is considered to be slight/moderate. No RPS or NIAH is located in the immediate vicinity of any of the proposed turbines. All built heritage structures are situated at a remove from the proposed turbine locations. In the wider landscape setting, the ZTV (used in the LVIA Chapter 12) shows that there may be varying levels of visibility from the locations of the built heritage structures and some where there is no visibility, in particular from the south. The ZTV is based on the worst-case scenario as it does not take natural screening or vegetation into account. In reality, the latter is likely to minimise any potential effects on setting. The residual impacts, where an impact has been identified are considered to be slight.

No new above ground archaeological sites were encountered within the area of the proposed turbines, roads and other infrastructure, however, it is possible that previously unknown sub-surface archaeological finds, features and deposits may be present not currently visible above ground. Mitigation measures include pre-development licensed archaeological testing of the proposed cable route in greenfield areas, Turbines/Hardstands for T3, T4, T6, T7, T14, T16 and T17, new roads where they are proposed in green fields and proposed new road along haul route. A licensed metal detection survey of water crossings along the cable route excavation is also recommended. Archaeological monitoring (under licence from the National Monuments Service) of all ground works during construction will also take place.

A small historic settlement is located outside the ELAR boundary to the north of T16. This will be preserved in situ resulting in no direct construction effects. Part of the associated historic road (southwestern section) will be utilised as the new access road to T16 and therefore direct impacts are anticipated. A photographic and descriptive record of the boundary removal that is proposed. This will be undertaken by the monitoring archaeologist in advance of groundworks associated with T16.

There are 3 wind farms located within a 20-kilometre radius of the proposed development site and any cumulative effects arising are considered in this assessment. Furthermore, there are no applications relating to significant commercial or infrastructural proposals, e.g. energy generation, transmission, industry etc., lodged within the immediate vicinity of the proposed wind farm within County Waterford or Cork. Planning applications in the vicinity predominantly relate to the provision of one-off housing and agricultural development.

All potential direct effects on cultural heritage have been assessed and mitigated. The mitigation measures when implemented will minimise, reduce or remove the impact altogether and therefore the addition of the Proposed Development to other surrounding projects (including other wind farms, one-off housing etc) will not result in cumulative effects at the construction stage.

Regarding National Monuments in State Care, the viewshed results show that since there are no instances of the proposed turbines being potentially visible from National Monuments that no cumulative effects on setting will occur when considering other projects. In this regard no cumulative effects will occur at the operational stage.

Regarding recorded monuments within 5km of turbines, no other wind farm projects are located within the 5km study area used to assess impacts on setting of recorded monuments/RPS/NIAH. In this regard no cumulative effects on the immediate setting of such monuments will occur. In the wider landscape setting, the ability to view other turbines (permitted, proposed and existing) as well as the proposed

turbines is such that cumulative effects on setting of cultural heritage assets may occur. These cumulative effects are likely to be mitigated by natural screening, vegetation and distance from the monuments however.

Material Assets

Traffic and Transport

The purpose of this section is to assess the effects, on roads and traffic, of the traffic movements that will be generated during the construction, operational and decommissioning phases of the proposed Lyrenacarriga Wind Farm Development. This section of the EIAR has been prepared by Alan Lipscombe of Alan Lipscombe Traffic and Transport Consultants Ltd. Alan is a competent expert in traffic and transport assessments.

For developments of this nature, the construction phase is the critical period with respect to the traffic effects experienced on the surrounding road network, in terms of both the additional traffic volumes that will be generated on the road network, and the geometric requirements of the abnormally large loads associated with the wind turbine plant. The requirements of the additional traffic and abnormal sized loads generated during the construction stage were assessed on both the external highway network and at the proposed junctions that will provide access to the site.

Three entrances are proposed for the construction stage of the proposed development in order to transport turbine components, materials and equipment to the site, as follows:

- **Access A** on the R634 regional road, into eastern cluster of turbines
- **Access B** on the L7806 local road, into western cluster of turbines, and
- **Access C** located on the L2003 local road into eastern cluster (non-turbine construction traffic).

An assessment of the haul route was made from the proposed port of entry for the large turbine components in Waterford.

The key findings of the traffic and transport impact assessment include:

- During the 317 days for the site preparation and ground works when deliveries to the site will take place, the effect on the surrounding road network will be negative, resulting in an increase in traffic levels ranging from 1.3% on the N25, to an increase of 11.3% on the R634 and 16.2% on the local roads approaching the site. On these days, the direct effect will be temporary and will be slight.
- During the 17 days when the concrete foundations are poured the effect on the surrounding road network will be negative, resulting in an increase in traffic levels ranging from 3.4% on the N25 to an increase of 29.3% on the R634, 41.7% on the local roads leading to the site access junctions. The direct effect will be temporary, and will be slight.
- During the 17 days of the turbine construction stage when general materials are delivered to the site, the delivery of construction materials will result in a negative impact on the surrounding road network, increasing traffic levels, ranging from 0.7% on the N25, to an increase of 5.8% on the R634 to 8.3% on the local roads leading to the site access junctions. The direct effect during this period will be temporary and will be slight.
- During the 31 days when the various component parts of the wind turbine plant are delivered to the site using extended articulated HGVs, the effect of the additional traffic on these days will be moderate due to the size of vehicles involved, resulting in increased traffic volumes of between 1.0% on the N25 to 8.7% on the R634 to 12.3% on the local road network. The direct effect will be reduced to slight if the delivery of the large plant is done at night, as is proposed.

Delivery of abnormal sized loads

The following are the main points to note for these deliveries which will take place after peak evening traffic:

- The delivery of turbine components is a specialist transport operation with the transportation of components carried out at night when traffic is at its lightest and the impact minimised.
- The deliveries will be made in consultation with the Local Authority and An Garda Síochána.
- It is estimated that 153 abnormal sized loads will be delivered to the site, comprising 31 convoys of 5, undertaken over 31 separate nights.
- These nights will be spread out over an approximate period of 16 weeks and will be agreed in advance with the relevant authorities
- In order to manage each of the travelling convoys, for each convoy there will be two police escort vehicles that will stop traffic at the front and rear of the convoy of 5 vehicles.
- There will also be two escort vehicles provided by the haulage company for each convoy.
- These vehicles will be reduced to the size of standard HGVs when leaving the site.

An outline Traffic Management Plan is provided in the CEMP in Appendix 4-4 of this EIAR. A confirmatory / final Traffic Management Plan (TMP) will be provided specifying details relating to traffic management and included in the CEMP prior to the commencement of the construction phase of the proposed development. The TMP will be agreed with the local authority and An Garda Síochána prior to construction works commencing on site.

During the operational phase, the direct effect on the surrounding local highway network will be neutral and long term given that there will be approximately two maintenance staff on average regularly travelling to site for routine inspections and maintenance work, resulting in typically two visits to the site regularly made by a car or light goods vehicle.

Telecommunications and Aviation

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

RTÉ Transmission Network (operating as 2rn), stated that they have no microwave links in the vicinity of the proposed windfarm site. However, to mitigate against potential interference to viewers in the area receiving from RTE sites at Dungarvan, Mullaganish and Ferrypoint (Youghal), RTÉ have recommended that a protocol agreement be put in place for the wind farm development. The Protocol Document ensures that in the event of any interference occurring to RTÉ television or radio reception due to operation of a wind farm, the required measures as set out in the document, will be carried out by the developer to rectify this. The Protocol Document ensures that the appropriate mitigation is carried out in the event of any unanticipated broadcast interference arising to RTÉ television or radio reception as a result of the proposed wind farm. Pending a grant of permission for the proposed wind farm, the applicant will sign and commit to the standard Protocol Document with RTÉ (2rn)

Of the scoping responses received from telephone, broadband and other telecommunications operators Eir, Three Ltd and Virgin Media noted links in the area and requested buffers to be included in the wind farm design to mitigate potential impacts on the associated links. Further communications with these operators stated that the proposed development will not impact on their links with these buffers incorporated into the design.

A scoping response was received from the Department of Defence (DoD) in which they indicated that they had no observations on the proposal

A scoping response was received from the Irish Aviation Authority (IAA). The requirements of the IAA include the following:

- Agree an aeronautical obstacle warning light scheme for the wind farm development.
- Provide as-constructed coordinates in WGS84 format together with ground and tip height elevations at each wind turbine location.
- Notify the Authority of intention to commence crane operations with a minimum of 30 days prior notification of their erection.

The nearest operational airport to the Proposed Development site is Cork Airport, located approximately 40 kilometres southwest of the site, and therefore outside the range at which such issues would be expected.

In response to the lighting requirements requested by the IAA the turbines will be marked on maps, lit at night and entered into aircraft navigation databases and therefore can be avoided during flight.

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

Interaction of Effects

Chapters 5 to 15 of this Environmental Impact Assessment Report (EIAR) identify the potential significant environmental effects that may occur in terms of Population and Human Health, Shadow Flicker, Biodiversity (Flora and Fauna), Birds (Ornithology), Land, Soils and Geology, Water (Hydrology and Hydrogeology), Air and Climate, Noise and Vibration, Landscape and Visual, Cultural Heritage (Archaeological, Architectural and Cultural Heritage) and Material Assets (Roads and Traffic, Telecommunications and Aviation), as a result of the proposed development as described in Chapter 4 of this EIAR. However, for any development with the potential for significant environmental effects there is also the potential for interaction between these effects. The result of interactive effects may exacerbate the magnitude of the effects or improve them or have a neutral effect.

A matrix is presented in Chapter 16 to identify potential interactions of effects between the various aspects of the environment already assessed in this EIAR. The matrix highlights the potential for the occurrence of positive, neutral or negative effects during both the construction (C) and operational (O) phases. It is considered that the potential effects during the decommissioning phase will be similar to the construction phase effects but of a lesser magnitude. The matrix is symmetric, with each environmental component addressed in the chapters of this EIAR being placed on both axes of a matrix, and therefore, each potential interaction is identified twice.

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 was not carried out by MKO, the entire project and all the work of all sub-consultants was managed and coordinated by the company. This 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 Chapter 16.

Where any potential negative impacts have been identified during the assessment process, these impacts have been avoided or reduced by design and the proposed mitigation measures, as presented throughout the EIAR and highlighted in Chapter 16.