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ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED COUMNAGAPPUL WIND FARM, CO. WATERFORD

VOLUME 1 - NON-TECHNICAL SUMMARY

Prepared for:

EMP Energy Limited (EMPower)

EMPower

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1. INTRODUCTION

1.1 Introduction

Fehily Timoney & Company (FT) has prepared this environmental impact assessment report (EIAR) on behalf of EMPower. EMPower intends to apply to An Bord Pleanála for planning permission to construct the proposed Coumnagappul Beg Wind Farm, near Ballymacarbry, County Waterford. The Proposed Development consists of the following main elements:

- The wind farm site (referred to in this EIAR as **'The Site'**);
- The grid connection (referred to in this EIAR as the **'GCR'**);
- The turbine delivery route (referred to in this EIAR as the **'TDR'**).

1.2 Site Description

The Proposed Development is located within an area of farmland, and upland heath within the townlands of Bleantasourmountain, Carrigbrack, Coumnagappul, Glennaneanemountain, Kilkeany, Kilkeany Mountain, Knocavanniamountain and Reanadampaun Commons The Proposed Development lies c. 15.8 km north of Dungarvan town centre and c. 14.5 km south east of Clonmel town centre.

The Proposed Development application area (i.e. the red line boundary depicting the land to which the application relates) encompasses a land area of 211 ha (2.12 km^2) and is shown on Figure 1.1 and Figure 1.2. The development footprint within the application area of the Proposed Development is 195 ha (1.95 km^2). Refer to Figure 2.2 for details of the overall wind farm layout.

1.3 Development Description

On 23rd May 2023, An Bord Pleanála deemed the Proposed Development is eligible as Strategic Infrastructure Development (SID) by way of a notice served under section 37B(4)(a) of the Planning and Development Act 2000 as amended and the application is being made directly to the Board (case ref. ABP-309259-21). The Board are the competent authority for the purposes of the Environmental Impact Assessment (EIA). An EIA is a legal requirement contained in *Schedule 6 of the Planning & Development Regulations 2001*, which contains the following:

1. *A description of the proposed development comprising information on the site, design, size and other relevant features of the proposed development….*
2. *Additional information, relevant to the specific characteristics of the development or type of development concerned and to the environmental features likely to be affected, on the following matters, by way of explanation or amplification of the information referred to in paragraph 1:*
    - *(a) a description of the proposed development, including, in particular—*
    - *(b) a description of the location of the proposed development,*
    - *(c) a description of the physical characteristics of the whole proposed development, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases,*

i. (iii)a description of the main characteristics of the operational phase of the proposed development (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used, and

(d) *an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation) and quantities and types of waste produced during the construction and operation phases*"

The Proposed Development by Coumnagappul Wind Farm Limited (the Applicant) includes a 10 no. turbine wind farm and associated infrastructure including internal access tracks, hard standings, permanent meteorological mast, onsite substation, internal electrical and communications cabling, temporary construction compounds, drainage infrastructure and all associated works related to the construction of the wind farm as well as measures designed to protect and enhance existing habitats and a connection to the National Electricity Grid (NEG).

The Proposed Development has been designed in accordance with The Department of Housing, Local Government and Heritage's 'Wind Energy Development Guidelines 2006' (the Wind Energy Guidelines 2006'). These current national guidelines are subject to targeted review, with the 'Draft Revised Wind Energy Development Guidelines' (draft WEGs) having been published by the Department of Housing, Planning and Local Government in December 2019.

The draft WEGs propose an increase in minimum turbine setback from nearby dwellings, requiring that a turbine should be located no closer than 500m from involved properties and a minimum setback of 4 times the turbine tip height from all third party properties (740 m based on the proposed turbine tip height of 185 m). The Proposed Development complies with the Wind Energy Guidelines 2006 and set back distance requirements under the draft Wind Energy Development Guidelines, 2019.

Presented in Chapter 2 is the Proposed Development and all other associated project components subject to EIA but for which planning consent is not being sought within the current application.

1.4 EIAR Structure

The EIAR has been prepared using the "grouped format structure" as outlined in the EPA's 'Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR) (2022). Using this structure there is a separate chapter for each topic, e.g. air quality and climate, biodiversity, hydrology. The description of the existing environment, the Proposed Development and the potential effects, mitigation measures and residual effects are grouped in the chapter. The grouped format makes it easy to investigate topics of interest and facilitates cross-reference to specialist studies.

The EIAR consists of the following chapters:

- Chapter 1 - Introduction
- Chapter 2 - Development Description
- Chapter 3 - Site Selection and Alternatives Considered
- Chapter 4 - Policy
- Chapter 5 - EIA Scoping and Consultation
- Chapter 6 - Population and Human Health

- Chapter 7 - Air Quality and Climate
- Chapter 8 - Noise and Vibration
- Chapter 9 - Biodiversity
- Chapter 10 - Ornithology
- Chapter 11 – Soils, Geology and Hydrogeology
- Chapter 12 – Hydrology and Water Quality & FRA
- Chapter 13 - Shadow Flicker
- Chapter 14 - Traffic and Transportation
- Chapter 15 - Archaeology, Architectural and Cultural Heritage
- Chapter 16 - Landscape and Visual Impact
- Chapter 17 - Material Assets, Telecommunications and Aviation
- Chapter 18 - Interactions of the Foregoing

The EIAR is structured as follows:

- Volume 1 – Non-Technical Summary (NTS)
- Volume 2 – Main EIAR
- Volume 3 – Appendices to the Main EIAR
- Volume 4 – Figures and Photomontages

It should also be noted, for the sake of completeness, that a separate Natura Impact Statement (NIS) has also been submitted with the planning application. The application is also supported by Planning Drawings.

1.5 Permission Period

A ten-year consent is being requested for this Proposed Development. That is, planning consent for the construction of the Proposed Development would remain valid for ten years following the grant of permission. The applicant requests a grant of permission on the basis of a 40-year operational period from the date of commissioning of the Proposed Development.

A permanent planning permission is being sought for the Grid Connection and substation as these will become an asset of the national grid under the management of EirGrid and will remain in place upon decommissioning of the Proposed Development.

1.6 Difficulties Encountered

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

2. DESCRIPTION OF PROPOSED DEVELOPMENT

2.1 Description of Proposed Development

The Proposed Development consists of a 10 no. turbine wind farm and associated infrastructure including internal access tracks, hard standings, permanent meteorological mast, onsite substation, internal electrical and communications cabling, temporary construction compounds, drainage infrastructure and all associated works related to the construction of the wind farm as well as measures designed to protect and enhance existing habitats and a connection to the National Electricity Grid (NEG).

The associated grid connection will consist entirely of an underground cable and will connect the proposed on-site substation to the existing 110kV substation at Dungarvan.

The TDR passes through the Port of Waterford, County Kilkenny, the N29, N25, N72, R672 and local road network to the proposed site entrance.

The Proposed Development for which consent is being sought will consist of the following:

- Construction of 10 no. wind turbines with a blade tip height of 185 m, a hub height of 104 m and a rotor diameter of 162 m.
- Construction of permanent turbine foundations and crane pad hardstanding areas and associated drainage;
- Construction of 1,17.71 m of new internal access tracks and associated drainage infrastructure;
- Upgrading of 11.46 m of existing tracks and associated drainage infrastructure;
- Creation of 1 no. new construction and operation access to the wind farm Site;
- Creation of 1 no. new construction and operation access to the permanent meteorological mast;
- All associated drainage and sediment control including interceptor drains, cross drains, sediment ponds and swales;
- Installation of new watercourse crossings including a 15m single span bridge crossing, an open bottomed culvert and a piped culvert;
- Removal and replacement of existing culverted watercourse and drain crossings along the cable route;
- Construction of 1 no. permanent onsite 110kV electrical substation and associated compound including:
    - Welfare facilities;
    - Electrical infrastructure;
    - Parking;
    - Wastewater holding tank;
    - Rainwater harvesting tank;
    - Security fencing;
- All associated infrastructure, services and site works including excavation, earthworks and spoil management;
- Development of 1 no. on-site borrow pit (150m L X 100m W /X 14m D) and associated ancillary drainage which will also act at a peat /spoil deposition area;

- 2 no. temporary construction compounds and associated ancillary infrastructure including parking;
- Forestry felling of 5.4 ha (53,995m m^2) to facilitate construction and operation of the proposed development;
- Installation of medium voltage electrical and communication cabling underground between the proposed turbines and the proposed on-site substation and associated ancillary works;
- Installation of 22.47 km of high voltage (110kV) and communication cabling underground between the proposed on-site substation and the existing Dungarvan Substation and associated ancillary works. The proposed grid connection cable works will include 6 no. existing watercourse and drain crossings, three of which will be crossed by Horizontal Directional Drilling. The grid also includes the installation of 30 no. pre-cast joint bays.
- Erection of 1 no. permanent meteorological mast to a height of 110m above ground level with a 4m lightning pole on top.
- Temporary enabling works to accommodate turbine delivery
    - Load bearing surfaces and temporary watercourse and drain crossings
    - Temporary removal of road signage, utility poles, bollards and fencing.

Certain temporary accommodation works associated with the Turbine Delivery and the provision of passing opportunities along the local road network are subject to this EIA but for which planning consent is not being sought within the current application. These works to facilitate the delivery of turbine components and haulage to Site are detailed further in Section *1.4.3 Turbine Delivery* and include hedge or tree cutting, relocation of powerlines/poles, lampposts, signage and local road widening. For these locations, works associated with private lands and road infrastructure have been identified and assessed in the EIAR, however, permission for these works will be sought separately with the local Planning Authority (Waterford City and County Council), through consultation and agreement with ESB and also through road opening license as necessary.

2.2 Wind Turbines

The final choice of turbine model is anticipated to be a Vestas V162 model wind turbine. This turbine model has been included for the purposes of EIAR and planning approval. The Vestas (Model : V162 6.0 – 7.2MW) is a conventional three-blade horizontal axis turbine. Schematic drawings of the candidate turbine accompany the planning application. The plans and particulars are precise and provide specific dimensions for the V162 turbine structures which have been used in this assessment. The turbine specification will have a hub height of 104 m and a rotor diameter of 162 m with a tip height of 185 m.

Turbine location co-ordinates in Irish Transverse Mercator (ITM) are detailed in Table 2-1.

Table 2-1: Turbine Coordinates

Turbine No. Note 1	ITM Easting	ITM Northing
T1	623836.95	610086.77
T2	624450.33	610262.63
T4	623765.98	609473.64
T5	624338.34	609616.17
T6	624985.13	609593.52
T7	624817.24	608984.47
T8	624437.82	608381.42
T10	624745.33	608019.25
T11	625248.04	607863.24
T12	623727.27	608212.24

Note 1: numbering is not sequential. This is due to turbines being removed from the array during constraints assessment and design iteration. See Chapter 3 for further details.

The turbine blades comprise fibreglass reinforced epoxy, carbon fibres and solid metal tip. The blades are 79.35 m in length with a width (maximum chord length) of 4.3 m. The swept area of the blades is 20,612 m2.

The turbines will have a cut in wind speed of 3 m/s and cut out speed of 25 m/s. Turbine rotor rotation is in a clockwise direction. The turbine begins generating electricity at a wind speed of 3 m/s, with rated power generation at wind speeds of approximately 12 to 14 m/s.

The dynamic operation range (the rate at which the blades rotate) of the Vestas V162 is 4.3 -12.1 revolutions per minute (rpm) which will be influenced by wind speed.

The turbine will be anchored to a foundation. Following detailed site investigations, it has been determined that the wind turbine foundations at Coumnagappul will be standard shallow reinforced concrete base pad foundations. The turbine foundations will be circular in shape and will be 25 m in diameter and 4 m in depth.

The turbine foundations will be constructed using standard reinforced concrete construction techniques.

2.3 Turbine Transport

Large turbine components will be transported to the site via the identified TDR.

The proposed access route to site, which is as follows:

- Loads will depart the Waterford Port and join the N29 travelling north west;

- Loads will turn left and join the westbound N25;
- Loads will turn right onto the N72 and continue west;
- Loads will turn right onto the R672 and travel north west;
- Loads will turn right at Clooncogaile Cross Roads to join the unclassified road eastbound;
- Loads will turn left at Ford's Cross Roads to join the unclassified road northbound; and
- Loads will turn right at Bryan's Cross Roads to follow the original route on the L5119 eastbound to site.

2.4 Construction

The construction sequence is expected to take c. 24 months. There are a number of items which will be conducted in parallel, but the basis of the construction programme will involve site establishment, site access road and drainage construction, hardstanding construction and substation works. The grid connection works are likely to be done in parallel with the site works and the turbine installation works and will be completed before the commissioning, reinstatement and landscaping phases are completed. However, it is also possible that the grid route could commence prior to the on-site infrastructure or subsequent to the construction of the on-site infrastructure. Carrying out the grid connection works in parallel with the site works represents the worst-case scenario as all works will be carried out at the same time.

The drainage system for the existing tracks and roads will be retained. All track widening will be undertaken using clean uncrushable stone with a minimum of fines. This will involve tree felling and hedge trimming and the upgrade of existing roadside ditches to allow widening.

For cable trenches located in public roads, the contractor will excavate cable trenches and then lay high density polyethylene (HDPE) ducting in the trench in a surround of cement bound material. A rope will be inserted into the ducts to facilitate cable-pulling later.

A similar construction methodology will be undertaken or cable trenches laid within site access tracks. In this case the cable-ducts will be laid when the track is being constructed and will follow the edge of the site access tracks. The trenches within these locations will be backfilled using the excavated material.

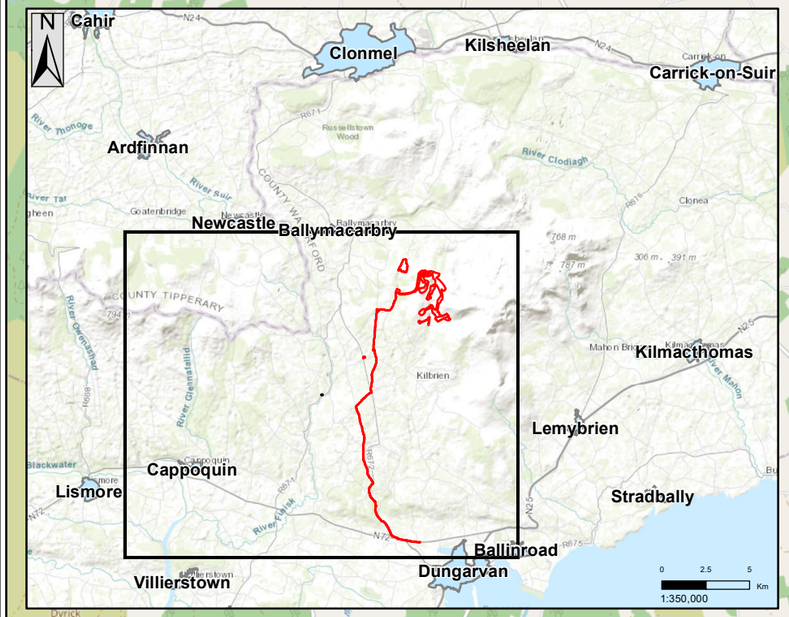
2.5 Operation, Maintenance and Decommissioning/Reinstatement

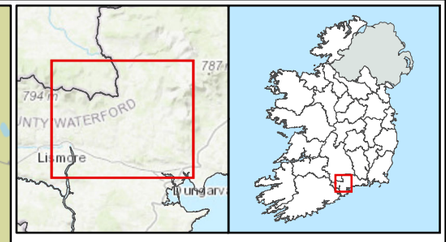
Permission is sought for a 40-year operation period commencing from full operational commissioning of the wind farm.

During the operation of the Proposed Development, some maintenance work may be required for the turbines and underground cabling. It will require maintenance and operations crews to tend to the site periodically throughout the lifetime of the project. It is unlikely that works will be required along the grid connection route during the operational phase unless maintenance is required. It is unlikely that the turbine delivery route will be used during the operational phase unless replacement or maintenance of turbine components is required.

On decommissioning, cranes will disassemble the above ground turbine components which will be removed off site for recycling. All the major component parts are bolted together, so this is a relatively straightforward process. The foundations will be covered over and allowed to re-vegetate naturally. Leaving the turbine foundations in situ is considered a more environmentally sustainable option as to remove the reinforced concrete would result in environmental nuisances such as noise, vibration, and dust. It is proposed that the internal site access tracks will be left in place.

Path: R:\Map Production\2020\P2360\Workspace\EIAR\NTS\P2360_GIS_Fig1-1_SiteLocation_A3.mxd





Legend

- Proposed Development Boundary
- Dungarvan 110kV Substation

TITLE: Proposed Development Boundary and Location			
PROJECT: Coumnagappul Wind Farm, Co. Waterford			
FIGURE NO:	2.1		
CLIENT:	EM Power		
SCALE:	1:70000	**REVISION:**	0
DATE:	13/10/2023	**PAGE SIZE:**	A3

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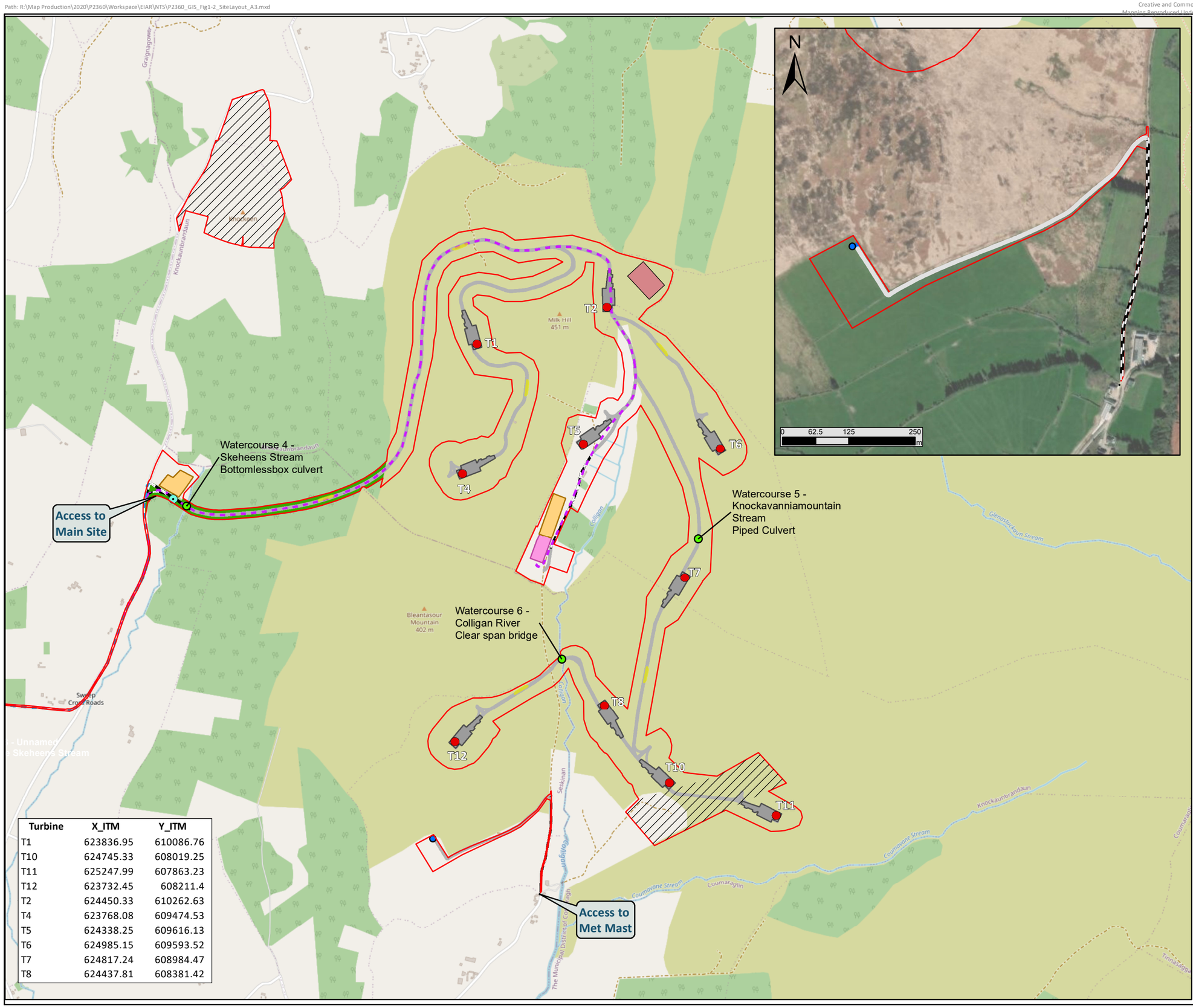
N W E S
0 2 4 8 Kilometers

Path: R:\Map Production\2020\P2360\Workspace\EIAR\NTS\P2360_GIS_Fig1-2_SiteLayout_A3.mxd



Turbine	X_ITM	Y_ITM
T1	623836.95	610086.76
T10	624745.33	608019.25
T11	625247.99	607863.23
T12	623732.45	608211.4
T2	624450.33	610262.63
T4	623768.08	609474.53
T5	624338.25	609616.13
T6	624985.15	609593.52
T7	624817.24	608984.47
T8	624437.81	608381.42

N W E S

0 200 400 800 Meters

Legend

- Proposed Development Boundary
- Habitat Enhancement Lands
- Watercourse Crossings
- Met Mast
- Proposed Turbine Location
- Wheel Wash Location
- Existing Tracks to be Uprgraded
- Proposed New Access Track
- Turbine Delivery Route
- Grid Connection Route
- 110kV Substation
- Temporary Construction Compound
- Turbine Hardstanding Area
- Passing Bays
- Borrow Pit / Spoil Management Area
- Area of Forestry Felling

TITLE:	Site Layout		
PROJECT:	Coumnagappul Wind Farm, Co. Waterford		
FIGURE NO:	2.2		
CLIENT:	EM Power		
SCALE:	1:17500	**REVISION:**	0
DATE:	13/10/2023	**PAGE SIZE:**	A3

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3. SITE SELECTION AND ALTERNATIVES CONSIDERED

3.1 The Need for the Proposed Development

The Proposed Development is necessary to produce renewable energy for the Irish national grid in order to transition Ireland to a low carbon economy. The Proposed Development will have an Export Capacity ranging from 60.0 MW to 72.0 MW depending on the power rating employed.

At a strategic level, the need for the Proposed Development is supported by International, European, and National environmental and energy commitments and policies. In Chapter 4: Policy of this EIAR, a detailed analysis of these commitments and policies is outlined. This is in the context of substantial and continuing failure by Ireland in meeting climate targets to date, as noted in the Ireland's Greenhouse Gas Emissions Projections 2022 – 2040, as published on June 02, 2023, which indicates that Ireland will fall short of its climate targets. Increased renewable energy generation, from wind and solar, if delivered as planned in the Climate Action Plan 2023 (CAP23), will reduce Energy Industry emissions by 60 per cent and achieve over 80 per cent renewable electricity generation by 2030.

CAP23 provides a framework for delivering the Government's target of a 51% reduction (relative to 2018) in greenhouse gas (GHG) emissions by 2030. CAP23 follows the Climate Action and Low Carbon Development (Amendment) Act 2021, which commits Ireland to a legally binding target of net zero greenhouse gas emissions no later than 2050, and a reduction of 51% by 2030.

3.2 Alternatives Considered

The requirement in relation to alternatives in the EIA process is set out in Directive 2011/92/EU, amended by Directive 2014/52/EU, in Article 5 (1)(d), which states that an EIAR should include:

> *"A description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment" Article 5(1)(f) of the EIA Directive requires that the EIAR contains "any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected."*

Annex IV of the EIA Directive states that the information provided in an EIAR should include a;

> *"Description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects."*

This section has particular regard to the environmental considerations which influenced the selection of alternatives and details the evolution of the Proposed Development through alternatives considered, indicating the main reasons for selecting the chosen option taking into account the effects of the Proposed Development on the receiving environment and considering the comparison of environmental effects of each alternative.

The alternatives considered have been described in line with the Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (2022). The Guidelines state that:

> *"It is generally sufficient to provide a broad description of each main alternative and the key issues associated with each, showing how environmental considerations were taken into account in deciding on the selected option. A detailed assessment (or 'mini-EIA') of each alternative is not required."*

Furthermore, the Guidelines note the following regarding high level plans and strategies which may influence or pre-determine decisions in the development process:

> *"Higher level alternatives may already have been addressed during the strategic environmental assessment of relevant strategies or plans. Assessment at that level is likely to have taken account of environmental considerations associated. Thus, these prior assessments of strategic alternatives may be considered and referred to in the EIAR."*

The section also details non-environmental factors of the development process where they are relevant to the evolution of the Proposed Development.

Ireland has binding targets set by the EU. Under the updated Climate Action Plan 2023 (CAP23), the Government's has a target of a 51% reduction (relative to 2018) in greenhouse gas (GHG) emissions by 2030. CAP23 follows the Climate Action and Low Carbon Development (Amendment) Act 2021, which commits Ireland to a legally binding target of net zero greenhouse gas emissions no later than 2050, and a reduction of 51% by 2030. The Act provides a governance framework for annual revisions of the Climate Action Plan and the development of a National Long-Term Climate Action Strategy at least once every ten years. As part of this plan, the Government is also committed to reducing emissions by an average 7% per annum by 2030.

These targets have been incorporated into national policy in the Climate Action Plan (CAP 2023) which aims to:

- The electricity system must achieve a 75% reduction in CO2, reaching 3MtCO2eq in the final year of 2026 - 2030 carbon budget period.
- Deliver up to 9 GW onshore wind (with 6GW by 2025), 8 GW solar, and at least 7 GW of offshore wind by 2030 (with 2GW specifically for green hydrogen production).
- Complete a revised version of Shaping our Electricity Future to define required new grid construction and reinforcements to achieve sectoral ceilings and carbon budgets.
- As an urgent priority, establish the investment framework and competitive market, arrangements needed to deliver zero carbon system services.
- Align the relevant constituent elements of the planning and permitting system to support accelerated renewable energy development and ensure renewables will be considered to be in the overriding public interest.
- New, dynamic Green Electricity Tariff will be developed by 2025 to incentivise people to use lower cost renewable electricity at times of high wind and solar generation.

Furthermore, the Climate Action and Low Carbon Development (Amendment) Act 2021 are five-yearly carbon budgets which commence in 2021, with provisions already in place for the first two, with the five-yearly carbon budgets equating to a total reduction of 51% emissions over the period to 2030. This reduction in emissions is in line with the programme for Government which commits to a 7% average yearly reduction in overall greenhouse gas emissions over the next decade to achieve net zero emissions by 2050.

3.2.1 Do-Nothing Alternative

Under the "Do-Nothing" scenario, the Proposed Development would not go ahead, the development of a renewable energy project is not pursued, and the site would remain in use as agriculture and forestry.

In the "Do-Nothing" scenario, the prospect of creating sustainable energy through County Waterford's wind energy resource would be lost at this site.

The nation's ability to produce sustainable energy and reduce greenhouse gas emissions to meet EU targets and National targets, as set out above, would be stifled. This may result in the nation incurring significant financial penalties from the EU if targets are not achieved, and result in continued global warming and impact upon the intention to "pursue efforts" to limit warming as agreed to in the Paris Agreement (2015). This will result in continued negative impacts to air quality and climate.

According to EirGrid Group's All-island Generation Capacity Statement 2020 – 2029 (Eirgrid, 2020), the growth in energy demand for the next ten years on the Island of Ireland will be between 17% and 41%. In the 'Do-nothing' scenario, importation of fossil fuels to maintain growing energy supply will continue and Ireland's energy security will remain vulnerable. A "Do-nothing" scenario would contribute to strain on existing energy infrastructure and may impact on economic growth if energy demand cannot be met. This may be exacerbated by the government's plans to cease the burning of coal at Moneypoint as well as the termination of all peat burning at Bord na Móna's powerplants in 2020.

Under the "Do-Nothing" scenario, the socio-economic benefits associated with the Proposed Development will be lost. These benefits include between 64 and 78 no. jobs during the construction phase of the project, and between 20 and 26 long-term jobs once operational. Furthermore, under the "Do-Nothing" scenario the local community will not benefit economically from the community benefit fund associated with the project which could be used to improve physical and social infrastructure in the area of the Site.

In the "Do-Nothing" scenario, the potential environmental impacts of the Proposed Development as set out throughout this EIAR will not occur. Chapter 3 - Site Selection and Alternatives Considered sets out the potential impacts of the 'do-nothing scenario' compared to the residual impacts associated with the Coumnagappul Wind Farm Project in relation to the various environmental topics covered in the individual chapters of this EIAR.

Alternatives Considered

The site selection process considered the following criteria:

- Available wind resource;
- Environmental constraints including low potential for impact on Natura 2000 sites;
- Population density
- Proximity to dwellings;
- Planning Policy;
- Reasonable access to the national electricity grid;
- Archaeological features;
- Landscape and visual constraints.

In addition to the criteria noted above acute attention is paid to the wind energy guidelines, local development plans, past wind farm planning applications and any planning case law that is published in relation to renewable/ energy projects.

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

- Site location relative to the County Council's Renewable Energy Strategy (RES) classification of areas considered suitable for wind farm development;
- Low population density;
- Consistent wind speeds;
- Protection of visual amenity;
- Access route availability;
- Proximity to water bodies;
- Land Ownership title constraints,
- Low potential for impact on designated National and European sites;
- Located outside areas designated for protection of ecological species and habitats;
- Access to the national electricity grid possible within a viable distance;
- Suitable topography / ground conditions;
- Sufficient area of unconstrained land that could potentially accommodate wind farm development and turbine spacing requirements

A number of sites were considered for a wind energy development, and, having applied the above criteria, it was concluded that the proposed Site is optimal for wind energy development.

Alternative layouts for the Proposed Development considered the following criteria:

- Set back from houses;
- Set back from designated sites;
- Set back from other constraints such as watercourses, public roads and power lines;
- Suitable wind speeds;
- Landscape and visual sensitivity;
- Ecology;
- Ornithology;
- Soils and Geology;
- Hydrology;
- Noise; and
- Cultural Heritage.

Five separate design iterations were produced in the development of the Proposed Development, which considered different numbers of turbines and a range of different turbine heights.

Four alternative underground grid routes were considered between the Proposed Development site and the Dungarvan Substation. An assessment of the potential for an overhead line grid route to the wind farm was also carried out. However, it was determined early on during the assessment that the distance involved between the proposed wind farm site and the Dungarvan 110kV substation posed an immediate constraint.

The alternatives considered throughout the development process of the Proposed Development aimed to minimise the potential impact on the receiving environment while providing significant renewable electricity production to the national grid.

4. POLICY

4.1 EU Directives and Policies

This section details the latest policies and targets with a view to 2030 and beyond. The various International, European, National and Regional directives and policies set a clear mandate for each member state to transition to sustainable, renewable energy and reduce greenhouse gas emissions.

International and European legally binding agreements to reduce the reliance on fossil fuels and to manage climate change internationally have been adopted into Ireland's National Energy Policy. Relevant international policies in relation to renewable energy and the need to prevent climate change include the *United Nations Framework Convention on Climate Change* and the *Kyoto Protocol*, which are legally binding agreements which are being facilitated through national energy and climate policy with a clear mandate to support onshore wind energy development within the state.

The various directives and policies of the EU set a clear mandate for each member state to transition to sustainable, renewable energy and reduce greenhouse gas emissions. This is reflected in the theme of European Commission President, Ursula von der Leyen's inaugural 'State of the Union' address delivered on 16 September 2020 which emphasised the need to transform the European economy and society to deal with the climate change emergency. It was also stated that the EU aims to reduce the EU's net greenhouse gas emission by at least 55% on 1990 levels by the end of this decade.

EU Directives and Policies include:

- European Union Targets and the Irish Context;
- 2030 Climate and Energy Framework;
- RePower EU Plan;
- The RePower EU PLAN states;
- A Roadmap for Moving to a Competitive Low Carbon Economy in 2050;
- Clean Energy for all Europeans Package (2019);
- Recast Renewable Energy Directive (RED2);
- European Green Deal (December 2019);
- European Climate Law (July 2021).

4.2 National Energy and Climate Policy

National energy and climate policy is derived from the overarching European Policy which aims to unify the European Union in energy and climate goals. The following section sets out the relevant national policies which will influence the development of the country in the coming decades with respect to energy production, carbon neutrality and climate change mitigation.

These policies are supported by the latest Programme for Government (2020) '*Our Shared Future*' which presents strong climate governance in rapidly reducing climate change in order to protect and improve public health and quality of life. The government are committed to rapid decarbonisation of the energy sector with an aim of providing the necessary actions to deliver national renewable electricity targets. These government ambitions support the ongoing generation of renewable energy from onshore wind sources, as detailed in the following section.

The importance in complying with the national energy policy at a local level cannot be overstated if Ireland is to achieve its national renewable energy targets. The recent increase in renewable electricity targets to 80% by 2030 indicates the need for significant escalation in renewable energy production in Ireland.

The following National Legislation and Policies include:

- Climate Action and Low Carbon Development Act 2015;
- Climate Action and Low Carbon Development (Amendment) Act 2021;
- Climate Action Plan 2023 (CAP23);
- National Energy and Climate Plan 2021-2023 (NECP);
- Project Ireland 2040: The National Planning Framework;
- Project Ireland 2040: National Development Plan 2021 – 2030;
- Ireland's Greenhouse Gas Emission Projections 2022 – 2040;
- Circular Economy and Miscellaneous Provisions Act 2022.

4.3 Regional and Local Plans

Regional and Local plans have also been adhered to, including the Southern Regional Spatial & Economic Strategy, the Waterford City and County Development Plan 2022-2028 which sets out the wind energy strategy for the county. The Proposed Development is located within an area described as a 'settled' landscape, which allows for enterprise in which renewable energy is envisioned as a use within, and therefore, can be considered compatible with the existing land use on the site.

The Proposed Development contributes to the nation's target increase of renewable energy from 30% to 80% by 2030 and supports the doubling of onshore wind energy in Ireland by 2030 as set out in the Climate Action Plan 2023.

4.4 Irish Energy & Environment Policies

The Proposed Development is in support of national policy. The project supports the enhancement of the competitiveness of rural areas and facilitates the development and diversification of the rural economy by supporting the energy sector and increasing the share of renewables in Ireland's energy mix.

The project supports national targets of climate change mitigation and reduction in greenhouse gas emissions where significant focus has been set out in the recent Climate Action and Low Carbon Development (Amendment) Act 2021. The ambitious new programme for government is prioritising carbon neutrality and renewable energy generation. In light of this, it is important to rely on proven technologies such as on shore wind in order to meet the near-term objectives, as well as long-term objectives.

The Proposed Development promotes the generation of renewable energy at appropriate locations and supports the achievement of a low carbon economy by 2050. It is therefore considered that the Proposed Development is in line with national policy and supports the achievement of national energy and sustainability targets.

4.5 Waterford City and County Development Plan 2022-2028

Specific policies relating to wind energy development in County Waterford are contained within the current Waterford City and County Development Plan (2022-2028), which came into effect on Tuesday 19th July 2022.

In relation to Renewable Energy, the Waterford City and County Development Plan 2022-2028, Chapter 6, Section 6.9 *Utility, Energy & Communication Policy Objectives* indicates that the Plan supports the delivery of sustainable sources of energy. Chapter 6 further outlines Waterford's approach to meeting the County's share of national renewable energy target of 15.5GW, with an onshore wind energy target of 8 GW. Within the lifetime of the Waterford City and County Development Plan 2022-2028, Waterford aims to deliver c. 2.64% of the onshore wind energy growth requirement (Waterford comprising 2.64% of the land mass of the Republic of Ireland), which equates to +211.20 MW.

The Proposed Development site was chosen as the result of a feasibility study which analysed the Proposed Development site, the surrounding environmental and other material factors pertinent to the current Waterford City and County Development Plan 2011-1017. Following the conclusion of the feasibility study, the Proposed Development site was deemed suitable on the basis on the criteria as provided within the previous County Development Plan 2011-1017 - Wind Energy Designation Map 2016-203.

The current Wind Energy Strategy of the Waterford County and City Development Plan 2022 – 2028 includes three classifications which are Exclusion, Preferred and Open to Consideration, with the Proposed Development within the area designated as 'Exclusion'. This designation contrasts with the previous Waterford County Development Plan 2011- 2017 '*Waterford Renewable Energy Strategy*', which designated the Proposed Development and surrounding landscape as an area 'Open to Consideration' in relation to wind energy development.

The Landscape and Seascape Character Assessment subdivides the counties landscape in to 7 landscape character types (LCTs) and a subsequent 28 landscape character units. The Proposed Development is located across three sensitivity classifications which are 'Most Sensitive', 'High Sensitivity' and 'Low Sensitivity'. The development is located in an area with varying landscape sensitivities; Most Sensitive, High Sensitivity and Low Sensitivity. The Proposed Development as a whole is not located in an area designated as the most sensitive from a landscape and visual perspective according to the County Development Plan.

The Proposed Development conflicts with the most recent iteration of Waterford Renewable Energy Strategy - Wind Energy Designation Map as per the Waterford City and County Development Plan 2022-2028. However, where the LCT aligns with the Waterford County and City Development Plan 2022 – 2028, and by extension the Renewable Energy Strategy 2016 – 2030, which has changed from an "open to consideration" to a "Exclusion" area, the Proposed Development still occupies a transitional landscape that aligns with how the landscape setting was formerly assigned as an area "open to consideration" for large commercial scale wind energy development.

5. EIA SCOPING, CONSULTATION & KEY ISSUES

5.1 Purpose of EIA Scoping

The purpose of the EIA scoping process is to identify the key points and issues which are likely to be important during the Environmental Impact Assessment (EIA) of the Project and to eliminate those that are not. The scoping process identifies sources or causes of potential environmental effects, the pathways by which the effects can happen, and the sensitive receptors which are likely to be affected. It defines the appropriate level of detail for the information to be provided in the EIAR. In essence, the primary focus of scoping is to define the most appropriate assessment of significant effects related to the Project. Scoping was carried out, in accordance with the European Commission's EIA Scoping Checklist (2017), under the EU's Environmental Impact Assessment (EIA) Directive (2011/92/EU as amended by 2014/52/EU).

The requirement to consider cumulative effects is outlined in EU and national legislation. The EIA Directive requires the consideration of:

> *'the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources'*

A desk study was undertaken to identify other existing and Proposed Developments with which significant cumulative effects could plausibly occur. This was further informed by consultation.

Consultation was carried out throughout the development of the EIAR and through various wind farm design iterations. The list of consultees is provided in Table 5-1 of Chapter 5 - EIA Scoping and Consultation. Consultees were invited to contribute to the EIAR by suggesting baseline data, survey methodologies and potential impacts that should be considered as part of the impact assessment process and in preparation of the EIAR.

Initial consultation commenced in August 2020 whereby consultees were invited to provide observations and comments in relation to an outline Proposed Development comprising 11 turbines. As the Project layout and design evolved commentary was again invited from consultees in August 2021 on the 10 turbine layout as per the Planning Application. Copies of the consultation responses received are included in Appendix 5-1 of Chapter 5 - EIA Scoping and Consultation.

5.2 Conclusion of EIA Scoping

Consultation was carried out with a number of stakeholders, including Waterford City and County Council, Government Departments, Non-Governmental Organisations, telecommunications providers, aviation organisations and local residents. Their comments and feedback were incorporated into the Project design iterations and to the assessments conducted in the EIAR.

Pre-planning consultation was held with Waterford City and County Council to determine the key points and potential impacts of the Proposed Development and to inform the assessment methodology. Further detailed correspondence was received from Waterford City and County Council during the scoping exercise which informed various aspects of the EIAR assessment as well as the scope of community consultation.

The public consultation was facilitated over four years. Public consultation meetings were hosted both online and in person which were advertised on the Project website and also by engaging with local newspapers and representatives and invitations sent by post to nearby dwellings which included updates on the Proposed Development. The purpose of these events was to engage with the wider community and present detailed information as the Project progressed. Project Information Newsletters were also distributed.

A dedicated email address, phone number and postal address was provided with circulated materials so members of the public could directly contact the project team. This process was commenced as early as possible in order to inform the design of the Project and to inform the EIA process prior to its commencement. A dedicated website was also set up to allow for further open communication between the Applicant and community throughout the development process and run-up to the application submission.

Observations and submissions received during the scoping and consultation process have informed the design, assessment and mitigation measures proposed as part of this Proposed Development as set out throughout this EIAR.

6. POPULATION AND HUMAN HEALTH

6.1 Population and Socioeconomic

One of the principal concerns in the development process is that individuals or communities, should experience no significant diminution in their quality of life from the direct, indirect or cumulative effects arising from the construction, operation and decommissioning of a development.

Relevant demographic data within proximity of the Proposed Development, TDR and GCR has been sourced from the Central Statistics Office (CSO) Census of Ireland (2006 to 2016, along with available data from 2022) records.

In the six years between the 2016 Census and the 2022 Census, Ireland has seen a national increase in population of 7.6%. This is a continuation of the upward trend in national population observed since 2006, which is similarly reflected at County level. Locally, within the Electoral Divisions (ED) associated with the Proposed Development, a slow growth in population has been observed since the 2006 Census relative to County level. The EDs encompassing the Site are rural in character consisting of one-off houses focused around the local road network and have significantly low population densities. There are no buildings within 4 times the tip height of the proposed wind turbines. According to Eircode data (2022) there are 40 properties within 2 km of the turbine array. The closest property to a turbine is located ca. 820 m distance and is roughly equidistant from south between Turbines T10 and 1.2km south from T12. As there are no significant effects predicted on population trends and population density, no mitigation measures are required.

The existing land-uses in proximity to the Proposed Development will remain broadly unchanged during the construction phase of the project, however, temporary effects on land use will arise as a result of the installation of the grid connection along the grid route which will be constructed within the public road corridor. Full road closures will be put in place to facilitate cabling works in combination with lane closures, partial road closures and stop/go systems. Turbine Delivery Route node upgrade activity has potential for slight, brief to temporary impacts to land use in proximity to each node.

It is anticipated that there will be minimal impact on existing land uses arising from the operational phase.

An estimate of between 102 and 122 jobs could be created during the construction, operation and maintenance phases of the proposed development with most construction workers and materials sourced locally, thereby helping to sustain employment in the construction trade. This will have a short term Significant Positive effect. It is possible that there will be direct employment for people living in the locality who may be qualified for construction related roles. Materials will also be sourced in the general locality where possible. This will aid in sustaining employment in the local construction trade. Furthermore, local businesses in the nearby towns and villages of Dungarvan, Ballymacarbry and Clonmel will likely receive a slight indirect positive economic impact due to the influx of workers to the area who will require services such as shops and food places.

A community benefit fund will be established for the Proposed Development and will be distributed in the local community. The provision of the Community Benefit Fund will have a significant long-term, positive effect on the socio-economic profile of the study area and wider area.

6.2 Tourism and Recreation

Overall, the most significant recreation activity/attractions in proximity to the Coumnagappul Wind Farm site is trail walking, Glamping, Clay Pidgeon Shooting, Mountain Biking, Equestrian Activity and Sports Grounds. There are a number of significant walking routes and trails associated with the Comeragh Mountains, however none of these routes are accessed via the Site and as such the Project will not impede tourist use of the Mountains.

Fáilte Ireland (2008, 2012), *Wind Farms – Visitor Attitudes on the Environment, National Tourism Development Authority, 2012/No.1*, Fáilte Ireland (2011), *Guidelines on the Treatment of Tourism in an Environmental Impact Statement* and Fáilte Ireland (2022), *Visitor Numbers to Attractions Dashboard*, indicate that the majority of tourists surveyed in Ireland and Scotland had a generally positive view on wind energy development in the landscape.

Overall, it is expected that the operational phase of the Proposed Development will have not have an impact following mitigation measures including mitigation by avoidance and design which has involved containing the Proposed Development, insofar as possible, within the horseshoe ridge the site is located along and within a final layout of 10 turbines at a tip height of 185m generated from an iterative design process.

6.3 Human Health & Safety

Overall, if unmitigated, the construction phase of the Proposed Development has potential for temporary significant, negative impact to human health and safety for construction workers and members of the public in proximity to the site, if proper construction safety protocols and traffic management are not applied. Mitigation measures will be implemented to prevent potential impact to human health and safety as outlined int eh CEMP.

Under normal conditions, operational wind turbines do not pose a threat to public safety or the safety of animals.

The Proposed Development has been examined with respect to potential impact from major accidents and natural disasters. This relates to:

- Flooding;
- Fire;
- Major incidents involving dangerous substances;
- Catastrophic events; and
- Landslides.

There is limited potential for major accidents or natural disasters to occur at the Proposed Development site. Bulk storage of hydrocarbons, chemicals and wastes will not occur on the Proposed Development site to provide further potential risks in the unlikely event of flooding, fire or landslides. Emergency protocols will be in place should an accident occur at the Proposed Development.

There is currently no published credible scientific evidence to positively link wind turbines with adverse health effects.

7. AIR QUALITY AND CLIMATE

This section describes the existing air quality and climate environment of the Proposed Development.

If the Proposed Development does not proceed, local air quality and the microclimate will remain unchanged. On a national scale, there will be an increase in greenhouse gas emissions if increasing future electricity needs are not met by alternative renewable sources which have the potential to contribute to air pollution and climate change. The opportunity to contribute to Ireland's commitments under the Kyoto Protocol and to meet national targets as set out in the Climate Action Plan (2023) would also be lost.

European air quality legislation requires that each member state be defined in terms of Zones and Agglomerations for air quality, with Ireland divided into four zones. The EPA has designated four zones within Ireland:

- Zone A: Dublin City and its environs
- Zone B: Cork City and its environs
- Zone C: 24 cities and towns (such as Galway, Limerick and Waterford cities and towns such as Naas, Newbridge, Celbridge, Leixlip) with a population of greater than 15,000
- Zone D covers the remainder of the country.

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

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

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

Some minor short term or temporary indirect emissions associated with the construction of the wind farm include vehicular and dust emissions. A Construction and Environmental Management Plan (CEMP) will be in place throughout the construction phase and includes dust suppression measures. In addition, turbines and construction materials will be transported to the site on specified haul routes only. The agreed haul route roads adjacent to the site will be regularly inspected for cleanliness and cleaned as necessary.

Once the Proposed Development is constructed there will be no significant direct emissions to atmosphere.

Maintenance vehicles will access the Proposed Development during the operational period, however, due to the low traffic movements involved, the impact will be imperceptible. The operational phase of the wind farm will result in positive impacts on air quality due to the displacement of fossil fuels as an energy source.

During the decommissioning phase, there will be truck movements associated with removing the wind turbines from the wind farm resulting in vehicular emissions and also dust. However, the number of truck movements would be significantly less than the construction phase and would potentially result in a slight temporary impact.

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.

Published in June 2023, the EPA's publication entitled 'Ireland's Greenhouse Gas Emission Projections (2022-2040)' provides an assessment of Ireland's total projected greenhouse gas (GHG) emissions from 2022 to 2040, and indicates that Ireland will fall short its climate targets. The Proposed Development will have an export capacity in the range of 60MW to 72MW and therefore will help contribute towards this target.

In terms of carbon losses and savings, the online Scottish Windfarm Carbon Assessment Tool (https://informatics.sepa.org.uk/CarbonCalculator/index.jsp) was used to estimate carbon savings as a result of the Proposed Development.

It is estimated that 3,176,680 - 3,814,600 tonnes of CO2 will be displaced over the proposed forty-year lifetime of the wind farm i.e. 79,417 - 95,365 tonnes of CO2 per annum, which assists in realising the ambitious goals of the Climate Action Plan.

Based on the Scottish Windfarm Carbon Assessment Tool, during the manufacturing and transportation of turbines, and construction and decommissioning of the turbines 59,286 - 70,498 tonnes of CO2 will be lost to the atmosphere. This represents 1.85 - 1.87 % of the total amount of CO2 emissions that will be offset by the Proposed Development.

As no significant impacts on climate are predicted during construction, operation and decommissioning no mitigation measures are necessary or proposed. In terms of the operational phase, the operation of the Proposed Development will have a positive effect on climate due to the displacement of fossil fuels and will have a significant long-term positive impact on climate change, in line with policy and legislation at a local, regional, national and international level.

8. NOISE AND VIBRATION

Within the Proposed Development, noise will be generated by the proposed temporary works, comprising construction activities at the Site, grid connection works and along the turbine delivery route. Noise will be generated during the operational phase by the rotation of the wind turbine blades and the turbine generator operation, as they generate electricity. Noise will also be generated during the decommissioning phase of the Proposed Development. These potential effects during decommissioning will be similar to those of the construction phase. Noise sensitive locations were identified in proximity to the Proposed Development.

Baseline noise monitoring was undertaken at receptor locations surrounding the Proposed Development to establish the existing background noise levels. The data was analysed in conjunction with on-site measured wind speed data.

8.1 Construction and Decommissioning Phase

Noise predictions were undertaken to determine the likely impact during the construction and decommissioning works. BS 5228-1:2009+A1:2014 sets out sound power levels and LAeq noise levels of plant items normally encountered on construction sites, which in turn enables the prediction of noise levels at selected locations.

The noise impact for construction works traffic will be mitigated by generally restricting movements along access routes to the standard working hours and exclude Sundays, unless specifically agreed otherwise. For example, during turbine erection and foundation pours, an extension to the working day may be required, i.e. 05:00 to 21:00, but this would be necessary only on a relatively small number of occasions.

The on-site construction and decommissioning noise levels will be below the relevant noise limit of 65 dB LAeq,1hr for operations exceeding one month, and therefore construction noise impacts are not considered to be significant. However, there is potential for temporary elevated noise levels due to the grid connection works. However, the impact of these works at any particular receptor will be for a short duration (i.e. less than 3 days). Where the works at elevated noise levels are required over an extended period at a given location, a temporary barrier or screen will be used to reduce noise levels below the noise limit where required. The noise impact will also be minimised by limiting the number of plant items operating simultaneously were reasonably practicable.

8.2 Operational Phase

Noise predictions have been carried out using International Standard ISO 9613, Acoustics – Attenuation of Sound during Propagation Outdoors. The propagation model described in Part 2 of this standard provides for the prediction of sound pressure levels based on either short-term downwind (i.e. worst case) conditions or long-term overall averages.

Only the worst-case downwind condition has been considered in this assessment, which is – for wind blowing from the proposed turbines towards the nearby houses. When the wind is blowing in the opposite direction noise levels may be significantly lower, especially where there is any shielding between the turbines and the houses.

The predicted noise predictions levels were performed for the 10-wind turbine layout using the highest noise levels at each wind speed, for the proposed turbine model selected for a range of standardised 10m height wind speeds from 2 m/s up to 14 m/s (to cut-out[1]). Receptors within the 35 dB LA90 noise contour of the turbines were modelled. A number of the receptors were identified as farm buildings or unoccupied derelict buildings, and these have not been considered as part of the impact assessment and were not assessed against the derived daytime and night-time noise levels. Predicted noise levels from other on-site noise sources were also modelled and cumulative noise from all on-site noise sources from the Proposed Development are assessed against the derived noise limits.

The predicted noise from the Proposed Development meets the daytime and night-time noise limits at the closest locations to the proposed windfarm, and therefore no mitigation is required.

Based on the predicted noise levels, a new source of noise will be introduced into the soundscape, and it is expected that there will be a long-term slight to moderate significance of impact for dwellings within the 35 dB LA90 study area with a moderate significance of impact on the closest dwellings to the Proposed Development.

[1] Noise emissions from the wind turbines plateau at wind speeds above 8 m/s

9. BIODIVERSITY

9.1 Existing Environment

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 for the Proposed Development as follows:

- Habitat and botanical surveys were undertaken on 27th and 28th July 2020, 07th and 08th September 2021 and 07th June 2022.
- Marsh Fritillary surveys – potentially suitable habitats were identified during walkover surveys in July 2020 and targeted larval web surveys were undertaken within these areas on the 08th September 2021.
- Mammal surveys were undertaken on 27th and 28th July 2020 and revisited on 07th and 08th September 2021.
- Bat activity transect surveys were carried out in April, July and August 2020. This was followed by a walkover survey of potential roosting habitats on 31st August 2020, which was repeated again on 09th September 2021 and 07th June 2022. Static detector surveys were also undertaken in 2020. This was followed by a static detector survey at height in 2022.
- Surveys to inform the aquatic ecology assessment were completed in 2020. The surveys included walkover surveys, catchment wide electro-fishing, White-clawed Crayfish Surveys (conventional methods and eDNA survey), Freshwater Pearl Mussel Survey, biological water quality survey.

This habitat mapping and assessment was undertaken following with 'A Guide to Habitats in Ireland' (Fossitt, 2000). No invasive species as listed on the Third schedule to the European Communities (Bird and Natural Habitat) Regulations 2011 (as amended) were observed within the Site. Two invasive species were recorded along the GCR, Himalayan balsam (one location) and rhododendron (one location) - within close proximity, but outside the proposed works area.

No flora listed on the FPO or as threatened, vulnerable or endangered on the Irish Red list were recorded during Site walkovers.

The wind farm Site encompasses a mixture of habitat types, with Wet heath habitats forming a large portion of the Site. Dense Bracken and Dry siliceous heath are also present on the upland slopes. Agricultural land, comprising Improved agricultural grassland, Scrub and Wet grassland, dominates the lowlands. Conifer plantation occurs on the western side of the Site along the proposed entrance to the Site. An Eroding/ Upland River flows through the centre of the site and on the western boundary. There are few examples of hedgerows, Treelines and Drainage ditches onsite, with the slopes being open and field boundaries largely restricted to the lowland fields.

- Turbine locations T02 and T05 are within wetland grassland habitat, assessed as locally important higher value.
- Turbine locations T06, T07, T08 and T10 are located within Dry siliceous heath habitat, which is assessed as locally important lower value.
- Turbine locations T01, T04, and T12 are within wet heath habitat assessed as higher value locally important (but degrading to lower value locally important in areas of burning).

- Turbine location T11 is within habitat is dominated by bracken and is assessed as locally important, higher value.

Three terrestrial mammals were identified during field surveys Red Fox (least concern conservation status), Wood Mouse (least concern conservation status) and Fallow Deer (an invasive species).

Bat surveys found Common pipistrelle, soprano pipistrelle and Leisler's bat to most commonly frequent the Site, with brown long-eared bat, Daubenton's bat, Nathusius' pipistrelle, Natterer's bat, and whiskered bat also detected but at significantly lower numbers. EcoBat analysis showed the Site to represent varying bat activity categories from low to high. The results indicate the potential presence of Pipistrelle and Leisler's bat roosts in the vicinity. Agricultural buildings to the southwest of the Site (located in excess of 500m from the nearest turbine) are considered to be the most likely roost location, albeit no permission to access these lands was provided in order to allow further survey.

Aquatic surveys in the catchment indicate the catchments to support salmonid species, lamprey species and European eel.

The EIAR has also included an appraisal of the likely significant effects of the Proposed Development either alone or in combination with other plans or projects on European Sites and sites of National Importance. The following sites were considered in the assessment:

- Comeragh Mountains SAC (001952)
- Nier Valley Woodlands SAC (000668)
- Lower River Suir SAC (002137)
- Blackwater River (Cork/Waterford) SAC (002170)
- Glendine Wood SAC (002324)
- Dungarvan Harbour SPA (004032) (also a Ramsar site (839)
- Mid-Waterford Coast SPA (004193)
- Comeragh Mountains pNHA (001952)
- Nier Valley Woodlands pNHA (000668)
- Toor Wood pNHA (001708)
- Glenboy Wood pNHA (000952)
- Dungarvan Harbour pNHA (000663)
- Kilsheelin Lake pNHA (001701)
- Stradbally Woods pNHA (001707)
- Marlfield Lake pNHA (001981)

9.2 Potential Effects

A Natura Impact Statement was prepared for the Proposed Development which identified potential for drainage from the Proposed Development to enter the Lower River Suir SAC, Blackwater River (Cork/Waterford) SAC, and the Dungarvan Harbour SPA. Mitigation is proposed within the NIS to ensure no potential for adverse effects on the integrity of these European Sites.

The most abundant habitat type within the Proposed Development Boundary is wet heath (57.99 ha). This is followed by dry siliceous heath (51.83 ha) and wet grassland (20.57 ha). In terms of collective loss of all heathland habitats, c. 13.19 ha of this grouping will be lost. No habitat correlating to Annex I type habitats will be lost or damaged due to the Proposed Development.

No mammal breeding or resting places occur within the Proposed Development Boundary, however there is evidence of mammal usage within eh Site. The construction phase of the development may result in temporary disturbance to fauna, however as this will be temporary in duration, and given the habitats present in the wider environment, affected mammals will be able to move to other locations in the wider area until the disturbance has ceased.

Collision mortality and barotrauma to bats was considered as part of the iterative design of the Proposed Development such that turbines have been placed in areas of open habitat away from edge ecology in order to limit the potential for effects on bats. Notwithstanding, potential for effects on bats are identified through Ecobat analysis, in the absence of mitigation, equating to a Long-term Significant Impact on a Local Level.

The watercourses associated with the Proposed Development are all small 2nd and 1st order streams with lower fishery value. Construction has potential to have significant effects on water quality and fishery habitat in the absence of mitigation.

9.3 Mitigation Measures

A Project Ecologist/Ecological Clerk of Works (ECoW) will be employed for the duration of the construction phase to ensure that all the mitigation measures outlined in the EIAR and NIS (and any planning consent) are implemented.

An Invasive Species Management Plan and Biodiversity Enhancement and Management Plan (BEMP) have been prepared for the Proposed Development (see Appendices Volume III).

Construction phase mitigation for hydrology and water quality will follow that outlined in Chapter 12 and the Proposed Development will incorporate SuDS.

The turbines are located within open areas of low growing habitat. In order to ensure that bats are not encouraged towards the turbines, vegetation will be maintained at a low sward height surrounding the turbines for a 101m diameter. Additionally the Proposed Development will include curtailment during bat activity season. Post-construction monitoring will inform the extent of curtailment.

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

10. ORNITHOLOGY

10.1 Existing Environment

This chapter assesses the likely significant effects that the proposed development may have on bird species.

Transect surveys along defined routes within and outside theProposed Development boundary as based on the methodology of Bibby et al (2000) were carried out between the Summer of 2019 and Summer of 2022 inclusive. Transect Route 1 followed an existing private access track which runs through the middle of the site from south to north. During the summer 2021 season, additional transect routes (2, 3 and 4) were added in the western area of the site to capture the relocation of proposed turbines. The habitat in this area differed slightly from the site's predominantly occurring habitats (mixture of conifer forestry and agricultural grassland). Additional targeted walkover surveys were carried out for merlin (*Falco columbarius*), red grouse (*Lagopus lagopus hibernicus*), golden plover (*Pluvialis apricaria*) in June and July 2020 and included Nocturnal surveys carried out on 09th June 2020 and 16th July 2020.

Vantage point surveys were undertaken with regard to 'Recommended bird survey methods to inform impact assessment of onshore wind farms' (SNH, 2017) between the Summer of 2019 and Summer of 2022 inclusive.

Hinterland survey was undertaken within a 2km radius of the north part of the site with particular focus on birds of prey and potential large assemblages of birds in June and July 2020

The target species recorded during all bird surveys carried out over the course of the survey period (3.5 years) can be categorised as follows (Annex I species are highlighted in bold, with the Conservation Status given for each species in accordance with Gilbert et al, 2021):

Raptors

- Hen harrier – BoCCI Amber-listed
- Merlin – BoCCI Amber-listed
- Peregrine – BoCCI Green-listed
- Kestrel – BoCCI Red-listed
- Buzzard – BoCCI Green-listed
- Sparrowhawk – BoCCI Green-listed

Wader/gull

- Golden plover – BoCCI Red-listed
- Snipe – BoCCI Red-listed
- Lesser black-backed gull - BoCCI Amber-listed

Game bird

- Red grouse BoCCI Red-listed

Using the Band method of collision risk modelling (Band *et al*., 2007; Band, 2012a), a CRM has been completed for the proposed Coumnagappul Wind Farm development. The data for this assessment was obtained from vantage point (VP) surveys carried out on site at Coumnagappul from April 2019 to September 2022, inclusive. The predicted collision risk of less than one collision per year for all species was calculated.

10.2 Potential Effects

The potential likely significant impact of wind turbines on birds may be considered as:

- Possible loss or deterioration of habitats; and
- Disturbance or displacement of birds.
- Direct collisions with turbines

Habitat loss can be direct through land take of breeding or foraging habitats for key species or indirect such as effective habitat loss through avoidance or disturbance due to the above factors. The construction of the Site tracks, turbine foundations and hardstandings, the substation compound, temporary site compound and excavation of the on-site borrow pit will result in some habitat damage and loss. Tree felling will be required as part of the project, to facilitate the access roads (5.4Ha forestry will need to be clear-felled).

It is not expected that the Proposed Development will cause a reduction in the baseline population of passerines as the area of nesting/foraging habitat lost will be Imperceptible to Slight.

The effects on Birds of Prey, Red Grouse and Waders/ Waterfowl were assessed as ranging from Imperceptible to Slight to Moderate Effect in the absence of mitigation.

10.3 Mitigation Measures

Mitigation includes site clearance outside of the bird breeding season. A Biodiversity Enhancement and Management Plan (BEMP) have been prepared for the Proposed Development (see Appendices Volume III).

Based on the detailed assessment, it is considered that the potential effects of the proposed development upon birds will not be significant. Residual 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.

11. SOILS, GEOLOGY AND HYDROGEOLOGY

The existing environment underlying the Proposed Development consists of Blanket Peat, a c. 170-400m wide north-south trending swath of till derived from Devonian sandstone traversing the middle of the site which is flanked on both sides by Blanket Peat and terminates c. 400m to the south of Milk Hill.

There are no known areas of soil contamination within the Proposed Development.

The Proposed Development site and a portion of the proposed grid connection are mainly located within the Kilrion Groundwater Body and also comprising a smaller area to the north belonging to the Comeragh GWB.

There are no Public Water Supplies or Public Supply Source Protection Areas within the Proposed Development site boundary. There are however 6 no. 'Source Protection Areas' for public water supply schemes in the wider area within 20km from the Proposed Development.

The GSI Online Minerals Database accessed via the Public Data Viewer shows no quarries (active or historic) or mineral occurrences within 5km of the Proposed Development area. The GSI Aggregates database indicates that there is an extremely low to moderate potential for crushed rock aggregate across the Proposed Development area. There is generally a low to moderate potential for granular aggregate with only localised areas displaying a high aggregate potential.

The Proposed Development is located within areas of 'Low' to 'Moderate High' susceptibility, with localised areas classified as 'High' (northernmost extent of the site). Peat depths were taken using a hand held Van Walt peat probe at proposed turbine and associated infrastructure locations. Results from the survey indicate that peat depths were generally very thin and characteristic of a highly organic Topsoil with a Peaty appearance. Depths ranged from 0.05 to 0.6m with mean and median values of 0.12 and 0.10m respectively.

The deepest deposit (0.60m) was encountered in the banks of a stream at ITM coordinates E 624238, N 608607 and is immediately flanked by shallow deposits to the east and west of 0.25 and 0.0m respectively. The survey results show this to be an outlier and not representative of peat depths across the Site. It will therefore be discounted. The next deepest deposit encountered was 0.40m.

As such and in accordance with the Scottish Executive Best Practice Guide for Proposed Electricity Generation Developments (2017), as peat deposits at the proposed turbine locations were <0.5m in depth a peat stability assessment was not warranted.

The topography across the site is defined by a series of ice sculpted mountain ridges, peaks and valleys. Elevations range from 450m (at Milk Hill) to 190m AOD. In general, the proposed site can be described as having moderate (5-8.5°) to steep (8.5-16.5°) slopes. Gradients noticeably increase to the southeast (east of turbine T11) ranging from steep to locally very steep slopes (16.5-25°). However, there is no Proposed Development within these areas of steeper terrain.

Slopes at the proposed turbine locations can be described as being moderate to steep, ranging from 3° (T01) to 15° (T07).

11.1 Potential Effects

11.1.1 Construction phase

During the construction phase, activities which may have an impact on soils, geology and hydrogeology prior to mitigation include:

- **Site Clearance**: This activity may expose underlying overburden, leading to increased erosion on localised peat deposits, organic soils, Glacial Till deposits, and bedrock.
- **Tree felling**: Tree felling machinery, used during this phase, may cause compaction of soft deposits, increasing surface water runoff and increased erosion of exposed soils such as localised peat deposits, organic soils, Glacial Till deposits, and bedrock.
- **Earthworks Associated with Construction**: This involves the removal of overburden material, open excavations and subsequent exposure of underlying overburden and bedrock as well as the importation of engineering fill and concrete which may lead to increased erosion, soil compaction and an increase in surface water runoff, resulting in increased erosion of exposed soils.
- **Slope Failure**: Slope failure may affect localised peat deposits, organic soils, Glacial Till deposits, and bedrock which impacts site operatives, existing infrastructure, and nearby residential areas. This is considered a matter of medium importance on this site prior to mitigation.
- **Construction of Turbine and Substation Foundations**: This activity involves open excavations and increased runoff which may create erosion of underlying overburden and bedrock. Construction traffic exacerbates the situation, resulting in soil compaction and increased surface water runoff, leading to more erosion of exposed soils. Importation of engineering fill and concrete products further contributes to the adverse effects on localised peat deposits, organic soils, Glacial Till deposits, bedrock, and local quarries which will create a slight significance prior to mitigation.
- **Construction of Internal Site Access Roads, Hardstands, and Temporary Compound:** Open excavations during these activities can lead to increased runoff, causing erosion of underlying overburden and bedrock. Construction traffic compacts the soil, increases surface water runoff, and contributes to erosion of exposed soils. Importation of engineering fill adds to the challenges. The receptors impacted are localised peat deposits, organic soils, Glacial Till deposits, bedrock, and local quarries. This activity is also considered of medium importance which will create a slight significance prior to mitigation.
- **Construction of the Grid Connection and Internal Cabling**: This activity involves the removal of overburden material and the exposure of underlying clay and bedrock to erosion. Construction traffic, importation of engineering fill and concrete products, as well as the disposal of surplus excavated material to licensed facilities, contribute to the adverse effects on localised peat deposits, organic soils, Glacial Till deposits, bedrock, local quarries, and licensed waste facilities, which has a slight significance prior to mitigation.
- **Horizontal Directional Drilling (HDD) at a Water Crossing Point**: During HDD operations, there's potential for overburden collapse, affecting localised peat deposits, organic soils, Glacial Till deposits, and bedrock which has a slight significance before mitigation.
- **Accommodation Works Along TDR:** Accommodation works also expose overburden material and underlying superficial deposits and bedrock to erosion. Construction traffic further compacts the soil, increases surface water runoff, and contributes to the erosion of exposed soils. Importation of engineering fill and the disposal of surplus excavated material to licensed facilities are additional risks. This impacts peat deposits, organic soils, Glacial Till deposits, bedrock, local quarries, and licensed waste facilities and has a slight significance on the project before mitigation.

11.1.2 Operational Phase

During the operational phase, activities which may have an impact on soils, geology and hydrogeology, include:

- **Construction Traffic for Maintenance Purposes**: During the operational phase, there is a potential for minor accidental leaks or spills of fuel/oil, which is predicted to have a slight effect on hydrogeology, soils and geology before taking into account any mitigation.
- **Operation of Substation**: The operation of the substation can lead to spills and leaks of oils/battery fluids, which has potential for a slight significance on the project without mitigation.
- **Maintenance of Access Tracks**: Importation of engineering fill from local quarries during maintenance activities can impact local quarries, which has potential for slight significance on the project without mitigation.

11.1.3 Decommissioning Phase

During the decommissioning phase, activities related to the removal of turbines and hardstands can result in construction traffic causing soil compaction and an increase in surface water runoff, resulting in increased erosion of exposed soils. This impacts localised peat deposits, organic soils, Glacial Till deposits, and bedrock. The sensitivity here is medium, with a small adverse magnitude and slight significance prior to mitigation.

11.1.4 Cumulative Effects

The cumulative effects of large-scale developments within 20km occurring concurrently with construction of the Proposed Development were also considered, with the cumulative impact of other existing, consented and proposed projects with the Proposed Development considered of medium importance, with a small adverse magnitude and slight significance before mitigation.

11.2 Mitigation Measures

The primary mitigation measure employed has been the design of the wind farm with detailed design and best practice implemented as shown below.

In order to reduce the impacts on soils, geology, hydrogeology and slope stability, infrastructure has been primarily located within areas of thinner peat/soft ground and lower slope gradients. Extensive work has already been undertaken at the preliminary design stage to apply risk avoidance by design which included:

- Peat probing, site walkover surveys and intrusive ground investigation to identify geotechnical constraints (e.g. peat deposits and evidence of historic landslip) likely to adversely affect the design of the Site.
- Relocate turbines, hardstanding's and access roads based on the site assessments and geotechnical assessments in order to reduce ground risk associated with the Site.
- The works have been designed and checked by geotechnical and civil engineers, who are suitably qualified and experienced in excavation and earthworks design and construction methodologies. Details of experience and competence is included in Chapter 1.

The following will also be implemented:

- The Project has been designed in accordance with best practice methodologies to include (but not limited to) guidance documents from the EPA, IGI and the Scottish Executive, as outlined within section 8.12 of Chapter 6 – Biodiversity.
- Any excavation and construction related works will be subject to a design risk assessment at detailed design stage to determine risk levels for the construction, operation and maintenance and decommissioning of the works within the parameters set out in the EIAR. Identified impacts will be minimised by the application of principles of avoidance, prevention and protection. Information on residual impacts will be recorded.
- Given that the works comprise a significant proportion of excavation and earthworks, suitably qualified and experienced geotechnical personnel will be required on Site to supervise the works.
- A detailed method statement for each element of the works will be prepared by the Contractor prior to any element of the work being carried out. These method statements will reviewed and approved by a qualified geotechnical engineer.
- The Contract will require programming of the works will be programmed such that earthworks are not scheduled during severe weather conditions. Where such weather is forecast, suitable measures will be taken to secure the works.

A Construction Environmental Management Plan (CEMP) has been prepared for the Proposed Development and is included in Volume 3, Appendix 3.1. The CEMP defines the work practices, environmental management procedures and management responsibilities relating to the construction phase of the Proposed Development. The CEMP will be a key construction contract document and the contractor will be obliged to implement it in full.

The CEMP sets out the key environmental management measures associated with the construction, operation and decommissioning of the Project, to ensure that during these phases of the Proposed Development, the environment is protected, and any potential impacts are minimized. The EMP will be developed further at the construction stage, on the appointment of the main Contractor to address the requirements of any relevant planning conditions, including any additional mitigation measures that are conditioned and will be submitted to An Bord Pleanála.

11.2.1 Conclusion

The Proposed Development is not considered to be located within a sensitive site in terms of soil, geology and hydrogeology, and poses a low risk for landslide.

A number of potential impacts have been identified associated with the excavation of soil and rock on the site. The significance of these potential impacts is assessed as being imperceptible to moderate significance prior to mitigation.

Findings from the site walkover surveys indicates no visual evidence of historic or contemporary landslides or ground instability at or adjacent to the proposed infrastructure locations. Only thin, superficial deposits of peat/ organic soils were encountered.

The project is not expected to result in any significant, negative cumulative effects with other existing, permitted or Proposed Developments in the vicinity.

With the mitigation measures put in place during construction, operational and decommissioning stage, the project will have an imperceptible impact on the soils, geology and hydrogeology.

12. HYDROLOGY AND WATER QUALITY AND FRA

12.1 Existing Environment

The Site is located within two waterbody catchments: these are the Colligan-Mahon catchment (Hydrometric Area 17) and the Suir catchment (Hydrometric Area 16). The Site is characterised by an extensive network of field drains, ditches and first-order streams which have been straightened and deepened in places through land management practices. Site topography is steep resulting in clusters of small runnels which join to form ditches, which, for the majority of the Site, drain to the Colligan River. There are no naturally occurring lakes or reservoirs within the Site. There are heavily modified surface waterbodies within the Site.

Within the Nier_020 sub-basin, the Shanballyanne stream drains away from the Site to the north. This drains into the Nier river, this in turn drains into the Suir river (sub-catchment Suir_SC_120).

Within the Colligan_010 sub-basin, the Skeheens Stream flows in a southerly direction along the western boundary of the Site and meets the Colligan river downstream. The Knockavanniamountain stream drains in a south-west direction near the centre of the Site, flowing into the Colligan river. The Glennaneanemountain stream and Carrigbrack stream flows in a south-west direction into the Colligan river near the southern boundary of the Site (outside of the Site).

All of the wind turbines (turbine foundation and hardstanding) are located a minimum of 100m away from any mapped WFD surface water. There are two construction compounds proposed for the Project. The first is to be located at the access to the Site and will be located 20m west of the Skeheens Stream. The second is to be located to the north of the on-site substation, located c.145m west of the Knockavannia mountain stream.

The GCR crosses Skeheens Stream which is within the Colligan_010 sub-catchment, and the Colligan River which is within the Colligan_010 sub-catchment. The GCR and TDR crosses the Ballynaguilkee Lower stream, which is tributary of the Blackwater River. The Blackwater River is a Special Area of Conservation (SAC). The Ballynaguilkee Lower stream is within the Finisk_SC_010 sub-catchment.

12.2 Potential Effects

During the construction phase, excavation and removal of vegetation cover and soil will be necessary and replaced with less permeable surfaces with a potential to contribute to an increase in runoff or a change in the hydrological response of the Site to rainfall.

Any alteration in the existing drainage regime / hydrology of the Site can impact on the volume of surface water which drains to the local streams and watercourses or to the rate at which such drainage occurs. This in turn can have an effect on hydromorphology through, for example, an increase in erosion and sediment transport, increase flow velocity, alteration of flood regime The proposed windfarm is located withing 3 sub-basin, the Colligan_010, the Nier_010 and the Nier_020.

The increase in impermeable area caused by wind farm footprint directly influences the volume and velocity of runoff. As the footprint expands, there is a larger proportion of impermeable surfaces compared to natural or vegetated areas. This alteration disrupts the natural hydrological cycle, reducing the amount of water that can be absorbed by the soil and increasing the amount of runoff generated.

As shown in Table 12-15 of Chapter 12: *Hydrology & Water Quality and FRA*, the increase of the impermeable area due to the Proposed Development it is minimal in comparison of the overall catchment of each sub-basin where it is located. However, when considering the most extended developed side of the windfarm, the entire area of the Colligan_010 sub-basin this increase is only by 0.303%.

During the operational phase, accidental pollution from spills and leaks of fuel, oil and chemicals from vehicles and maintenance works may occur. Additionally, transformer oil will be used in cooling the transformers associated with the sub-station which creates potential for oil spills during any oil replacement activity or leaks during the operational phase, although the likelihood of this is low. There is no significant risk of sediment release to cause increase suspended solids in surface waters during the operational phase as vegetation will not be disturbed during this phase.

In the decommissioning phase, wind turbines will be deconstructed by unbolting the components by accessing using cranes. The hardstandings and foundation pedestals of the turbines will be covered over (with soil that was stripped during construction) and allowed to re-vegetate. This is less disruptive to the environment than removing the hardstandings and foundations.

Infrastructure that will be left in-situ following decommissioning includes; internal site access tracks, GCR infrastructure, including the on-site substation and ancillary electrical equipment.

12.3 Mitigation Measures

A process of 'mitigation by avoidance', as informed by constraints assessment and consultation, was undertaken by the EIA team during the design of the wind farm layout and selection of grid connection route (refer to Chapter 3 - *Site Selection and Alternatives* for further detail) with the objective of avoiding / minimising the potential for significant effects on water quality and hydrology. The Site layout and drainage infrastructure has been designed such that it is sympathetic to the existing topography and aims to maintain the existing hydrological regime of the Site such that it does not create a changed hydrological response to precipitation.

The infrastructure has been located such that it is set back as far as reasonably practicable from hydrological features, with an ethos of achieving a minimum setback of 75m between mapped surface waters and wind farm infrastructure, and a minimum setback of 15m from non-mapped streams and drainage features with the exception of HDD locations and watercourse crossings.

Objective BD17 of the Waterford City and County Development Plan 2022-2028 requires that a buffer zone of at least 15m is maintained between the development works and the top of the riverbank.

The GCR that was selected aims to limit the number of watercourse crossings and to cross by HDD where feasible in order to limit interaction with the watercourse and to protect riparian habitat.

A Surface Water Management Plan that will be implemented during the construction, operation and decommissioning stages of the Proposed Development describes the following:

- Collect surface water runoff upgradient of the Proposed Development via interceptor drains and will redistribution this 'clean' collected runoff downgradient of the Proposed Development by means of cross drains which will release via diffuse outfalls to vegetated areas (within the same catchment) or will divert the runoff back into the existing network serving the catchment. This drainage design aims to maintain the hydrological regime at the Site.
- Collect surface water runoff from the footprint of the Proposed Development (during construction, operation and decommissioning) and discharge diffusely to adjacent vegetated areas via settlement ponds, with a view to protecting water quality.

12.3.1 Attenuation and Flood Risk

The Proposed Development will increase the impermeable area within the Site and as such can potentially increase the rate and volume of surface water runoff in response to precipitation events. Mitigation measures to address surface water runoff and drainage include in line attenuation features such as check dams and stilling ponds and diffuse outfalls with a view to maintaining the baseline hydrological regime and to provide attenuation at greenfield run-off rates.

All access tracks will be constructed from aggregate which will allow a portion of rainfall to infiltrate and, therefore, reduce surface water runoff. Adjacent swales will also intercept and retain surface water runoff allowing this to disperse naturally via infiltration and evapotranspiration. Where swales are installed on sloped ground, check dam structures will be used within the channels to provide attenuation, allowing a portion of the flows to disperse naturally.

Swales and drainage channels will discharge runoff from access roads and areas of hardstanding to settlement ponds. These will be suitably sized to accommodate flows from storm events up to and including the 1 in 100-year storm event.

Settlement ponds will not discharge directly to any drain or watercourse. Rather, flows from the ponds will be dispersed diffusely over land to allow natural overland flow and percolation within the catchment.

Watercourse crossings have been designed and suitably sized to accommodate peak, or storm discharge rates so as not to cause risk of impeding flows during extreme storm events and causing flooding upstream of the crossing. All drain and watercourse crossings will be designed in accordance with the requirements of Regulation 50 of the European Communities (Assessment and Management of Flood Risks) Regulations 2010 SI 122 of 2010. The channel width will be maintained, and the crossings have been designed so as not to cause an impediment to the passage of woody debris or sediment transport. Appropriate freeboard will be provided to OPW requirements.

The cable trenches will be excavated in dry weather where possible, infilled, and revegetated if required to prevent soil erosion or generation of silt pollution of nearby surface water. There will, therefore, be no increase in the risk of flooding.

The surface water management system at the Site will ensure that there will be no increase in the risk of fluvial or surface water flooding downstream as a result of the proposed windfarm development.

13. SHADOW FLICKER

13.1 Potential Effects

Under certain combinations of geographical position, wind direction, weather conditions and times of day and year, the sun may pass behind the rotors of a wind turbine and cast a shadow over the windows of nearby buildings. When the blades rotate and the shadow passes a window, to a person within that room the shadow appears to 'flick' on and off; this effect is known as 'shadow flicker'.

A shadow flicker assessment has been undertaken on 15 receptors within 10 rotor diameters of the Proposed Development.

Based on the Wind Energy Development Guidelines 2006 (WEDG 2006) thresholds, the predicted 'Maximum Theoretical Hours Per Day' of shadow flicker exceeds 30 minutes at 8 receptors.

When considering the 'Total Theoretical Hours Per Year', 9 receptors are predicted to exceed the WEDG 2006 threshold of more than 30 hours per year. However, when accounting for a more 'likely' scenario, where the average annual sunshine hours are taken into account, no receptors are predicted to exceed more than 30 hours per year.

A scheme of mitigation will be implemented into the turbine control software to cease turbine operation during periods when shadow flicker effects are predicted to occur, assuming that all other conditions required for shadow flicker are also present e.g. no cloud obscuring the sun, correct orientation of the turbine etc.. These mitigation measures will be applied to ensure that near zero shadow flicker effects occur, allowing for the reaction time of the shadow flicker control modules and also allowing for a short period of time for the turbine blades to slow down to a stop.

No cumulative effects with other proposed or operational wind farms in the area are predicted to occur on any receptors in the study area.

Shadow flicker can only occur as a by-product of wind turbine operation; as such, there will be no shadow flicker effects during the decommissioning phase.

13.2 Mitigation Measures

The Applicant will install a shadow flicker impact control system at turbines no. 1, 2 and 11 which have the potential to cause shadow flicker on nearby properties. This system will be installed prior to operation of turbines.

A shadow flicker control system consists of a number of control modules with associated light sensors, clock and timer, and specialised software. The calculated shadow flicker periods will be input into the turbine control software and when the correct conditions are met i.e. the light intensity is sufficient, during a potential period of shadow flicker, individual turbines will cease operation until the conditions for shadow flicker are no longer present. The actual light level that would trigger a turbine shut down will be manually configured to reflect local conditions. Shadow flicker control modules will be used to ensure that a near zero level of shadow flicker is achieved, allowing for the reaction time of the shadow flicker control modules and also allowing for a short period of time for the turbine blades to slow down to a stop.

14. TRAFFIC AND TRANSPORT

14.1 Existing Environment

The study area for the traffic and transportation study includes the main wind farm site along with the surrounding road network leading to and from the main wind farm site. The site entrance is also assessed. The roads associated with the grid connection are assessed as is the turbine delivery route.

There are several local roads in the vicinity of the Proposed Development. The proposed delivery route proposes the use of one of the local roads to the west of the site, the local road which connects the proposed site entrance to the R672 near Tooraneena (L-5119).

The closest regional road is the R672 which is c. 5.3km to the west of the proposed site. The R672 connects the N25 near Dungarvan to Clonmel with the R-671 near Ballynamult. The R-672 will form approximately 13km section of the turbine delivery route and c. 4.15km section of the grid connection route.

The closest national secondary route to the south of the site is the N72. The N72 connecting the N25 near Dungarvan to the N70 in Killorgan is found c. 14km from the site boundary. The AADT for the N72 in 2022 according to TII automatic traffic counter data was 4,957 with 4.5% of this total made up of HGV traffic.

The grid connection route (GCR) will utilise the local roads L-5068 for approximately 4.6km, the L-1041 for approximately 1.2km, the L-5111 for approximately 2.25km and the L-5113 for c. 85m. The route requires trenching within undesignated local roads for approximately 4.2km before entering the site and connecting to the onsite substation.

The N72 will form a c. 5.2km section of the turbine delivery route and c. 1.3km of the grid connection route.

14.2 Potential Effects

The construction activities associated with the project will lead to additional construction related traffic on the existing public road network over the duration of the construction works. Without appropriate mitigation measures, the proposed works have the potential to lead to a negative impact on the existing road network.

The traffic impact associated with the grid connection cable works will fall into two main categories, the construction traffic related impacts and the road/lane closure related impacts. The use of heavy goods vehicles, light goods vehicles and the transport of materials will be involved with the grid connection. The grid connection construction works will require a combination of temporary road closures with traffic diversions and temporary lane closures along the proposed route.

All road works will be subject to a road opening licence, but it is anticipated that the cable installation along local roads will be advanced using a combination of rolling lane closures and temporary road closures where the existing road width is insufficient to accommodate an open lane for traffic to pass the works area.

The delivery of turbine components including blades, tower sections and nacelles is a specialist transport operation owing to the oversized loads involved. The blades are the longest component and have been considered for the purpose of this assessment.

Turbine component deliveries will be carried out during off-peak times and will be done using a convoy and a specialist heavy haulage company. Turbine deliveries will also be escorted by An Garda Siochána. This will ensure the impacts of the turbine deliveries on the existing road network are minimized.

As further described in Section 14.4 of Chapter 14: *Traffic and Transportation*, accommodation works are required along the turbine delivery route such as hedge or tree cutting, relocation of powerlines/poles, lampposts, signage and temporary local road widening through the laying of compacted aggregate to verges. Prior to mitigation measures, this could include a negative impact on the existing road network such as delay and disruption to road users, road safety issues, inappropriate parking of construction vehicle, soiling of the public road and existing public road infrastructure damage.

The largest possible blade and tower components for the range of turbine options were considered and modelled using Autotrack vehicle modelling software to ensure that the potential environmental effects for the full range were fully assessed.

A small number of full-time wind farm personnel are expected to be present during the operational phase of the project.

Unforeseen or unplanned events such as emergency turbine repair works could potentially require the mobilisation of construction plant and personnel to site or grid route. The replacement of a large turbine component such as a blade will require a crane and the re-installation of some Turbine Delivery Route temporary accommodation works. In such an event, it is considered that negative or adverse effects on the receiving environment will be temporary in duration and not significant to slight following appropriate mitigation measures.

The potential impacts associated with the decommissioning phase will be significantly less than the construction phase due to the considerably lower number of vehicle movements.

14.3 Mitigation Measures

A number of mitigation measures will be employed during construction to reduce, minimise or eliminate the potential impacts created by the project and outlined above. These measures include a detailed Traffic Management Plan (TMP) which will be agreed with the road's authority and An Garda Siochána prior to commencing construction, with mitigation measures proposed for the grid connection works to include:

- Road Opening : The road works associated with the grid connection cabling will be completed in line with the requirements of a road opening license as agreed with the local authority.
- Route Proofing: In advance of the main grid connection works an assessment will be carried out to define the precise alignment of the cable route within the corridor which has been assessed. This will include slit trenching with the aim of minimising the construction impacts and avoiding existing services in the road.
- Road Cleanliness: Appropriate steps will be taken to prevent soil/dirt generated during the works from being transported on the public road. Road sweeping vehicles will be used when necessary, to ensure that the public road network remains clean.
- Temporary Trench Reinstatement: Trenches on public roads, once backfilled, will be temporarily reinstated to the satisfaction of the road's authority.
- Surface Overlay after Trench Reinstatement: following temporary reinstatement of trenches on public roads, sections of the public roads will receive a full surface overlay. Details to be agreed with the roads authority At a minimum they will be reinstated to their pre-works condition or better and to the satisfaction of the road's authority.

The turbine delivery route has been assessed using a detailed appraisal of potential routes and the identification of the most appropriate route including the accommodation requirements along the route to mitigate the impact of the turbine delivery. The impact of the deliveries on traffic is mitigated by delivering components during off-peak or night-time deliveries. Mitigation measures proposed for the turbine delivery route also include:

- Programme of Deliveries: a programme of deliveries will be submitted to the road's authority in advance of deliveries of turbine components to the site. The programme will include details of the dates and times of each component delivery along with the route to be taken. Turbine component deliveries will be carried out during off-peak times and will be done using a convoy and a specialist heavy haulage company.
- Garda Escort: Turbine deliveries will be escorted by An Garda Siochána. This will ensure the impacts of the turbine deliveries on the existing road network are minimised.
- Reinstatement: Any area affected by the works to facilitate turbine delivery will be fully reinstated to its original condition.
- Consultation: Consultation with the local residents and Waterford County Council will be carried out in advance to manage turbine component deliveries.

During the operational phase of the Proposed Development, site entrances to the site to be maintained continually to ensure visibility conditions at these entrances has not deteriorated. Hedgerow maintenance will be required periodically to ensure continued visibility at site entrances.

Once the decommissioning phase commences, traffic impact associated with the decommissioning phase will be significantly less than the construction phase. Infrastructure associated with the grid connection will form part of the national transmission network and will be left in-situ. Therefore, no impacts are envisaged upon decommissioning of the wind farm project and no mitigation is required. All decommissioning works are to be carried out in accordance with a decommissioning plan to be agreed with the planning authority in advance of the decommissioning works. Traffic management measures identified will be included in the decommissioning plan for the wind farm.

15. ARCHAEOLOGY, ARCHITECTURAL AND CULTURAL HERITAGE

Chapter 15 assesses the potential effects of the Proposed Development on the known and potential cultural heritage resource which encompasses assets relevant to both the tangible resources, such as archaeology and architecture heritage; and non-tangible resources including history, folklore, tradition, language and placenames).

The Archaeological Survey of Ireland has classified the only two recorded archaeological sites (WA014-042---- & WA014-044----) located within the Site as 'redundant records' as they have concluded that neither are archaeological in origin. There are an additional 28 recorded archaeological sites, two of which are redundant records, located within lands extending for 1km in all directions from the Site boundary. All of these sites are located within private lands not accessible to the public. A review of the landscape extending for 10m in all directions from the Site revealed that there are no National Monuments within this area. There are ten extant prehistoric archaeological monuments with potential visual alignments located in private lands within 10km of the Site and these comprise standing stone pairs, stone rows and an unclassified megalithic tomb. A review of Archaeological Survey of Ireland descriptions of these monuments revealed that none have recorded alignments orientated directly towards the Site.

There are no Protected Structures, Architectural Conservation Areas or structures/lands included in the National Inventory of Architectural Heritage located within the Site or in the surrounding 1km study area.

There were three previously unrecorded features of cultural heritage potential identified within the Site during field-walking surveys. These comprise a drystone structure (with an associated field) which is of vernacular heritage interest, an upright stone of archaeological potential and a cluster of small field clearance cairns which may be of recent origin. There are no proposed development works at any of their locations and the mitigation strategies presented in the chapter include measures to ensure that they will be adequately protected within appropriate buffer zones during the construction phase. No direct construction phase effects on any of these undesignated constraints are, therefore, predicted.

While there are a number of archaeological and architectural heritage constraints located within the environs of the grid connection route localised work areas required to facilitate the delivery of turbines of the Site, no direct effects on any of these constraints are predicted.

There are no known archaeological, architectural or cultural heritage constraints located within the footprint of the development works, and there will, therefore, be no direct physical effects on any known archaeological or architectural heritage constraints during any phase of the Development.

The Proposed Development has the potential to contain unrecorded, sub-surface archaeological remains and should the presence of such remains be revealed during the construction phase, they would be likely to suffer a high magnitude of impact. As such, the mitigation for potential effects on unknown archaeological remains will entail archaeological monitoring of ground works during the construction phase under licence by the National Monuments Service and this will be carried out by a suitably qualified archaeologist. In the event that any sub-surface archaeological remains are identified during monitoring they will be recorded in situ and securely cordoned off while the National Monuments Service are consulted to determine further appropriate mitigation measures, which may include preservation in situ (by avoidance) or preservation by record (archaeological excavation).

The Operational phase will result in a range of long term, indirect negative effects on the wider settings of archaeological sites within the environs of the Site which will range from not significant to slight in significance. Given the nature of the wind farm turbines there are no mitigation measures that can remove or reduce these indirect effects, but it is noted that they will be reversed following the decommissioning phase.

The Construction and Operational phases will not result in any predicted significant effects on the cultural heritage resource. The assessment does not predict any likely cumulative or residual effects on the cultural heritage resource that are significant in terms of the EIA Regulations.

16. LANDSCAPE AND VISUAL IMPACT

The area containing the Proposed Development is complex and heavily influenced by the Comeragh and Monavullagh Mountains, which occur throughout the southern, eastern and northern extents of the study area. The Site itself is located along the transitional western foothills of the Comeragh Mountains and is contained within a horseshoe ridge that opens to the south. The Site's elevation ranges between c. 250-500m AOD, with the most elevated locations along the eastern extents of the Site where the terrain transitions towards a more typical upland setting. Milk Hill (451m AOD) and Bleantassour Mountain (402m AOD) contain the Site to the north and west, respectively, whilst an assemblage of rolling hilltop summits and elevated ridges, including Seefin (726m AOD), Coumfea (741m AOD) and Fouscoum/Kilclooney Mountain (792m AOD) contain the Site to the east. The Coumavane Stream is the nearest watercourse to the Proposed Development and is located just over 400m to the south of the site. The Coumavane Stream merges with the Colligan River slightly further to the south of the Site and flows throughout the study area in a general southerly direction towards the settlement of Dungarvan. The Glenastuckaun Stream flows east of the site and is located just under c. 1km from the nearest turbine. The Glenastuckaun Stream flows north-westerly and merges with the River Nire, one of the most notable watercourses in the central study area. The River Nire is situated some 4km north of the Site at its nearest point and flows throughout the northern half of the central study area in a general westerly direction. The landscape to the north of the site in the surrounds of the Nire river valley has a strong sense of enclosure as it is contained to the north, east and south by upland hills and ridges within the Comeragh Mountains. To the west of the Site, beyond Bleantassour Mountain, the terrain transitions to a more typical low-rolling landscape context punctuated by small river valleys and streams.

The wider study area is as complex and varied as the central study area and contains the broader extents of the Comeragh and Monavullagh Mountains, whilst the Knockmealdown Mountains are located throughout the western half of the study area. In addition, Slievenamon punctuates the northern periphery of the study area, whilst the complex and rugged coastline of County Waterford is located throughout the wider southeast quadrant of the study area.

Other notable watercourses within the wider study area include the River Suir, which traverses the wider northern half of the study area and flows in a general easterly direction to the north of the Comeragh Mountains. The River Blackwater is also a prominent watercourse within the study area and is located in the wider southwest quadrant of the study area, where it flows past the settlement of Cappoquin south of the Knockmealdown foothills.

The Site is contained in a mix of mountain moorland and commercial conifer forestry. The most notable areas of mountain moorland are contained throughout the most elevated locations within the Site. Areas of pastoral farmland are also contained in the lower-lying areas of the Site in the surrounds of the nearby streams and rivers.

The most elevated parts of the Comeraghs to the east of the Site are cloaked in a mix of upland blanket bog, moorland and heath and isolated upland lakes. The most notable of these is Coumshingaun Lough, situated on the eastern extents of the Comeragh Mountains, some 7km from the Site. Extensive blocks of commercial conifer forestry also cloak the foothill landscapes surrounding the uplands within the study area, whilst small conifer forest blocks are also located throughout the rolling lowlands. Linear swathes of riparian woodland often cloak the corridors of the many small streams and rivers that flow throughout the study area. Nonetheless, the predominant land use within the study area is that of pastoral farmland bound by networks of mixed hedgerow vegetation. Within the wider southeast quadrant of the study area is the complex coastline of County Waterford. The coastline comprises rugged coastal cliffs, enclosed bays and broad river estuaries.

The study area also encompasses a notable number of small to medium-sized settlements. The largest area of urban land cover is that of Clonmel, situated to the north of the Comeragh Mountains in the northern half of the study area. In addition, the linear transport routes of the N24, N25, N72 and N76 are also notable utilitarian land uses within the wider study area.

16.1 Potential Effects

Given the highly visible nature of commercial wind energy developments it is not generally feasible to screen them from view using on-site measures as would be the primary form of mitigation for many other types of development. Instead, landscape and visual mitigation for wind farms must be incorporated into the early stage site selection and design phases.

In this instance, the two main forms of landscape and visual mitigation employed were:

- Avoidance in design
- Buffering of Residential Receptors

16.1.1 Avoidance in Design

Macro Works have been involved in the Proposed Development since 2020, when early-stage constraints and layout analysis assessments took place. One of the main mitigation by design measures employed after the early stage constraints and layout analysis assessments was to contain the Proposed Development, as far as possible, within the horse-shoe ridge the site is located along and within. A set of preliminary wireframe montages were generated from some key viewpoints throughout the study area, which identified that some of the turbines in the initial layout appeared slightly disjointed from the main turbine array and presented slightly out of context as they were located further uphill along the eastern extents of the site. Thus, when viewed from surrounding receptors, some of these turbines appeared as slight outliers and presented along the more elevated, rugged sections of the Comeragh Mountains, as opposed to the transitional foothills that the remaining turbines in the proposed array are located in.

As part of further design iterations, an additional turbine was sited to the west of the horse-shoe ridge within an area of conifer forestry along the west-facing sloping lands. Further sets of preliminary wireframe montages identified this turbine presented as an outlier to the rest of the Proposed Development. As part of further mitigation measures in line with the existing proposals to contain all proposed turbines within or along the horse-shoe ride, this turbine was also relocated to the sloping lands within the horse-shoe ridge and landscape context of the remaining proposed turbines.

Furthermore, an assessment of various layouts was undertaken ranging from 10-14 turbines at tip heights ranging from 150-200m (refer to Appendix 16.4, Chapter 16: *Landscape and Visual Impact*). It was considered that the layout of 14 turbines at a tip height 150m presented slightly disjointed in this landscape context with little sense of order and extended further in to the elevated uplands than then the 10 turbine arrays. With regard to the 10 turbine arrays, both of these were viewed in a much more compressible manner in this landscape context and presented as being contained within and along the horseshoe ridge. Nonetheless, it was considered that the 200m tip height turbines had more potential to generate a sense of overbearing for local receptors in this context than the 185m tip height turbines. As a result, a final layout comprising 10 turbines located within or along the horseshoe ridge at a tip height of 185m was then generated from this iterative design process.

16.1.2 Buffering of Residential Receptors

For the Proposed Development, the minimum distance of any turbine from the nearest residential receptor is c. 820m, which is in excess of the draft Wind Energy Development Guidelines (2019) minimum set back of 500m and the setback distance of 4 times the tip height of the proposed turbines. In this instance the setback for visual amenity purposes would be 740m from residential receptors on the basis of the 185m high turbines.

Variation in residential buffer distances within the nearest kilometre has a much more noticeable effect on perceived turbine scale than when it occurs in the context of more distant views. This is due to the law of perspective – that doubling the distance to an object halves its perceived height. The reduction factor is even more pronounced when considered in the context of the 'swept area' of turbine blades and not just their tip height. This exponential scale in relation to distance scenario is illustrated in Figure 16.9 of Chapter 16 *Landscape and Visual Impact*.

16.2 Construction Phase

It is considered that the Proposed Development will have a modest physical impact on the landscape within the Site as none of the Proposed Development features have a large 'footprint' and land disturbance/vegetation clearing will be relatively limited. The topography and land cover of the Site will remain largely unaltered with construction being limited to tracks, areas of hard standing for the turbines, the on-site substation compound, temporary site construction compounds, proposed met masts, borrow pit construction, felling of forestry to create clearance for turbines and the proposed bridge crossing. Excavations will tie into existing ground levels as far as possible and will be the minimum required for efficient working. Any temporary excavations or stockpiles of material will be re-graded to marry into existing site levels and reseeded appropriately in conjunction with advice from the project ecologist. Tree felling of approximately 5.4 ha of coniferous forestry is required at the main entrance to the Proposed Development and along a short section of the internal access tracks (for approximately 1.2km) to accommodate the construction.

The finalised internal access track layout has been designed to avoid environmental constraints, and every effort has been made to minimise the length of necessary roadway by utilising and upgrading the existing site access track. Furthermore, the road layout has been designed to follow the natural contours of the land wherever possible reducing potential for areas of excessive 'cut and fill'. There will be an intensity of construction stage activity associated with the access tracks and turbine hardstands consisting of the movement of heavy machinery and materials, but this will be temporary/short term in duration and transient in location. The construction stage effects on landscape character from these activities will be minor.

All internal site cabling will be underground and will follow site access tracks without the need for trenching through open ground. Indeed, the land cover of the Site will only be interrupted as necessary to build the structures of the Proposed Development and to provide access. Impacts from land disturbance and vegetation loss at the site are considered to be modest in the context of this transitional foothill landscape setting that is influenced by an array of working rural land uses. Some forest felling will be necessary to accommodate the construction access tracks in the western extents of the Site. All forestry that is removed will be subject to forest replanting provisions.

One permanent meteorological (Met) masts will be erected on site and will comprise of 110m high lattice steel masts with a shallow concrete foundation. The most notable construction stage effects here relate to the minor amount of ground excavation required to facilitate the shallow foundations for the steel mast structure. The Proposed Development also includes the construction of a new access to the met mast along a local road in the townland of Reanadampaun Commons west of Bleantasour Mountain.

A watercourse bridge crossing will also be constructed as part of the Proposed Development and comprise a single span bridge c. 15m in length which will rise some c. 2.5m above the existing ground levels. The bridge structure will be constructed using a mix of steel and concrete, generating localised landscape impacts in its immediate surroundings. Nonetheless, due to its relatively modest scale and relatively contained location, it has limited potential to generate any notable landscape impacts on within the immediate or central study area.

Site activity will be at its greatest during the construction phase due to the operation of machinery on site and movement of heavy vehicles to and from site. This phase will have a more significant impact on the character of the site and cable routes than the operational phase, but it is a 'short-term' impact that will cease as soon as the Proposed Development is constructed and becomes operational (approximately 18-24 months from the commencement of construction).

There will be some long term/permanent construction stage effects on the physical landscape in the form of turbine foundations and hardstands, access tracks and a substation, but only the substation is likely to remain in perpetuity as part of the national grid network with the turbine foundations remaining in-situ and covered in soil. It is likely, that with the exception of some residually useful access tracks, all other development features will be removed from the Site, and it will be reinstated / restored to the prevailing land cover. Thus, the construction stage landscape effects of the Proposed Development are largely reversible.

There will be some construction stage effects on landscape character generated by the intensity of construction activities (workers and heavy machinery) as well as areas of bare-ground and stockpiling of materials as identified in the Construction and Environmental Management Plan (CEMP). Such effects will be temporary/short term in duration and are, therefore, not considered to be significant. Overall, construction stage landscape effects are considered to be of a High-medium magnitude.

16.3 Operational and Decomissioning Phase

For most commercial wind energy developments, the greatest potential for landscape impacts to occur is as a result of the change in character of the immediate area due to the introduction of tall structures with moving components. Thus, wind turbines that may not have been a characteristic feature of the area become a new defining element of that landscape character. In this instance, wind turbines are not a characteristic feature of the immediate study area, albeit the wider study area is influenced by some existing wind farm development the most notable of which is an 8 turbine development (Woodhouse) in the wider southern periphery of the 20km extents. Two single turbine developments are also located within the wider study area, however, due to their scale, they have little notable influence on the character of the wider landscape (Refer to Section 16.6 of Chapter 16: *Landscape and Visual Impact* for further assessment of cumulative effects).

In terms of scale and function, the Proposed Development is well assimilated within the context of the central study area. This is due to the broad scale of the landform, landscape elements and land use patterns. These attributes prevent the height and extent of the Proposed Development from causing the type of scale conflict that can occur in more intricate landscape areas. Some of the rolling hills, ridges and the foothill landscape in the immediate surrounds of the Site have a notable working character due to the presence of the existing commercial conifer plantations and broad areas of pastoral farmland that occur within and around the Site. Although the Proposed Development represents a stronger human presence and level of built development than currently exists on the Site, it will not detract significantly from transitional working character.

It is important to note that in terms of duration, this Proposed Development represents a long term, but not permanent impact on the landscape and is reversible. The lifespan of the project is 40 years, after which time it will be dismantled, and the landscape reinstated to prevailing conditions. Within 2-3 years of decommissioning there will be little evidence that a wind farm ever existed on the Site, albeit the proposed on-site substation will remain in perpetuity as part of the national grid infrastructure, in addition to residually useful access tracks.

The decommissioning phase will have similar temporary impacts as the construction phase with the movement of large turbine components away from the site. There may be a minor loss of roadside and trackside vegetation that has grown during the operational phase of the project, but this can be reinstated upon completion of decommissioning. Areas of hard standing that are of no further use will be reinstated and reseeded to blend with the prevailing surrounding land cover of the time. It is expected that the decommissioning phase would be completed within a period of approximately 3 months.

There will be physical impacts on the land cover of the Site as a result of the Proposed Development during the operational phase, but these will be relatively minor in the context of this productive rural landscape that comprises of existing wind energy developments and extensive areas of commercial conifer forest. Whilst the Proposed Development represents a notable intensification of development in the local landscape context, the scale of the Proposed Development will be well assimilated within its landscape context without undue conflicts of scale with underlying land form and land use patterns. For these reasons, the magnitude of the landscape impact is deemed to be High-Medium within the site and its immediate environs (c.1km) reducing to Medium for the remainder of the central Study Area. The quality of the landscape effects is deemed Negative. Beyond 5km from the Site, the magnitude of landscape impact is deemed to reduce to Low and Negligible at increasing distances as the wind farm becomes a proportionately smaller and integrated component of the overall landscape fabric.

Overall, the Proposed Development will result in an intensification of wind energy development within this landscape context and within the surrounds of the Comeragh and Knockmealedown Mountains. Furthermore, existing wind energy development is an established feature within the wider study area (existing Woodhouse Wind Farm), whilst an existing single turbine is located just over c. 5km west of the Proposed Development. A permitted development (Knocknamona) is also located along the southern periphery of the study area, which will notably increase the number of turbines within the study area when constructed. Overall, the Proposed Development has the potential to be viewed in combination with other existing, permitted and Proposed Development, however, it is well offset from any other wind farm developments and, thus, will present with no notable negative cumulative aesthetic effects. On balance of the reasons outlined above, the Proposed Development is considered to contribute to a cumulative impact no greater than Low with other existing and permitted developments and no greater than Medium with existing permitted and proposed wind farm developments.

17. MATERIAL ASSETS, TELECOMMUNICATIONS AND AVIATION

The Proposed Development has been examined for the potential impact on material assets, telecommunications and aviation. An examination of material assets was carried out which includes renewable and non-renewable resources and utility infrastructure. A desktop study established material assets of the area such as quarries and peat bogs, in line with Geological Survey Ireland's scoping response as detailed in Chapter 5: *EIA Scoping and Consultation*. Infrastructure and various telecommunications companies were contacted during the scoping process to identify infrastructure in the area. Potential impacts on the identified material assets as a result of the Proposed Development were then examined. Consultation with telecommunications providers and airport and aviation authorities was carried out. Telecommunication providers were asked to identify their infrastructure and links in the area in order to identify potential impacts to their services from the proposed wind turbines. Similarly, the airport and aviation authorities were asked to identify potential impact from the proposed turbines on infrastructure and airfields.

17.1 Potential Effects

17.1.1 Material Assets - Renewable, Non-Renewable Resources and Utility Infrastructure

The construction of the Proposed Development will impact on natural resources such as aggregates which will be sourced from batching plants, quarries and pits in proximity to the site.

The Proposed Development is intended to capture the renewable wind resource at the site. There will be no negative effects on the renewable wind resource of the receiving environment. Trees felled for the Proposed Development will be replanted at another unplanted location as required by Irish Forest Service Guidelines.

The temporary removal of overhead utility infrastructure has the potential to cause a brief to temporary non-significant negative impact on nearby dwellings and commercial/industrial activities in proximity to Turbine Delivery Route nodes.

The proposed GCR will not impact on existing electrical infrastructure entering the existing Dungarvan substation.

During the construction phase of the Proposed Development, waste will be generated due to the various construction activities and materials required for the installation of infrastructure at the Site, grid route and turbine delivery route. In line with the National Waste Management Guidelines for the circular economy and European Waste Management Hierarchy, the developer and appointed contractor will aim to prevent, reduce, reuse and recover as much of the waste generated on site as practicable and to ensure the appropriate transport and disposal of residual waste off site.

Once the Coumnagappul Wind Farm is operational, the potential for negative effects on material assets is minimal. Maintenance of access tracks and infrastructure may require small amounts of imported fill, however, the impact of this is likely to be slight/imperceptible.

The direct effect of electricity generated by the Proposed Development will give rise to a reduction in the quantity of fossil fuels required for electricity generation across the State. This will give rise to a long-term slight positive impact on renewable energy resource and will contribute to reducing Ireland's dependency on imported fuel resources.

Significant volume of waste is not expected to be produced during the operation phase of the Proposed Development.

Decommissioning works will include removal of above ground structures including the turbines and met masts. Turbine foundations and access tracks will be left in situ. The proposed on-site substation building will be taken in charge by ESB which will have a long-term slight positive impact on electricity infrastructure provision in the area. There will be no significant negative impacts on renewable and non-renewable resources during the decommissioning phase.

17.1.2 Telecommunications and Aviation

In the context of wind farm development, electromagnetic interference is the impact of a wind farm on existing telecommunication services resulting in an unacceptable negative impact. The rotating blades of a wind turbine can occasionally cause interference to electro-magnetically-propagated signals. Such interference could, in theory, affect all forms of electromagnetic communications including:

- Satellite communications
- RADAR
- Cellular radio communications
- Aircraft instrument landing systems
- Air traffic control
- Terrestrial telecommunication links
- Television broadcasts

Aviation and telecommunications modelling was carried out based maximum turbine tip height and rotor diameter dimensions in order to determine the potential effects on telecommunications and aviation.

For the purposes of the telecommunications impact assessment, point-to-point and point-to-multipoint signals are considered, both are used extensively throughout Ireland. Point to point (or line of sight) is a wireless telecommunications transmission link between two nodes located at specified fixed points.

The term telecommunications link relates to the wireless transmission of data via radio frequencies between two fixed points. Telecommunications towers are generally used to transmit and receive signals over large distances. Radio frequency bands above 1 GHz are referred to as microwave radio links and are commonly used by telecommunications operators.

The proposed turbines have potential to interfere by acting as a physical barrier with these links if positioned in between their points.

The potential for electromagnetic interference from wind turbines occurs only during the commissioning and operational phase of the Project. There are no potential electromagnetic interference effects associated with the construction phase or decommissioning phase of the Project on telecommunications and broadcasting in the area.

As the proposed grid connection will be constructed underground in the public roadway, there are no construction related impacts for electromagnetic interference and broadcasting interests in the area.

There is potential for aviation impacts during the late construction phase of a wind farm project and prior to the commissioning of the Proposed Development as the wind turbines are constructed and placed in situ. The turbines could be considered to be an obstacle to low flying craft. However, no impacts are anticipated following consultation with Irish Aviation Authority, IAA's Air Navigation Service Provider (ANSP), Minister of Defence, Dublin Airport Authority and Waterford Airport.

As the proposed grid connection will be constructed underground within the public roadway, there are no construction related impacts on aviation interests associated with the Grid Connection Route.

During the operation phase, it is not expected that the proposed grid connection will have any operational related impacts on telecommunications and broadcasting interests in the area. There is potential for negative impact to domestic broadcasting receivers due to signal scattering or signal delay as a result of the introduction of wind turbines to the landscape. Providers have not identified potential impacts to their services, however, there is potential for slight negative long-term effects to broadcasting services in the area of the Site. This may depend on wind speed and direction. However, it is considered that the grid connection is not expected to impact on telecommunications during the operational phase and would result in a brief slight negative impact to telecommunications services along the Turbine Delivery Route.

There is not expected to be any temporary impact to overhead lines during the operational phase of the Proposed Development. In the unlikely event that a turbine requires repair or replacement, a brief to temporary impact to overhead lines will occur during the delivery of turbine components. There is not expected to impact on telecommunications during the operational phase as a result of the Grid Connection. Impacts on overhead lines as a result of turbine delivery is only associated with the construction process. There is potential that overhead lines may require brief disruption in the unlikely event that a turbine component requires replacement - in this case the turbine delivery route is required to be used during the operational phase

There are no electromagnetic interference impacts associated with the decommissioning phase of the Proposed Development, and therefore no mitigation required.

There is potential for brief disconnection of overhead lines during the decommissioning phase if large turbine components are required to be removed from the Site. This has potential to cause a brief slight negative impact to telecommunication services where overhead lines require disconnection.

During the decommissioning phase, the turbines will be dismantled and removed from the site, thereby removing all potential obstacles to aviation interests. There will be no likely effects on aviation during the decommissioning phase.

The proposed grid connection will be left in situ underground within the public roadway. There are no decommissioning related impacts on aviation associated with the Grid Connection Route.

17.2 Mitigation Measures

17.2.1 Material Assets - Renewable, Non-Renewable Resources and Utility Infrastructure

Existing services along the proposed grid connection cable route have been predicted through a desktop study and will be confirmed in the pre-construction surveys prior to construction. This will minimise the impact in terms of disruption or damage to existing utilities. It is not intended to divert existing services but instead, where possible, the cable will be laid above or below existing services. Communication with service providers will be maintained for the duration of the construction works where required.

Non-renewable resources of general construction fill will be sourced locally and will be excavated from on-site borrow pits as far as possible to minimise transportation distances, reducing CO2 emissions.

Where services and street furniture are required to be removed temporarily to accommodate turbine delivery, residents and business in proximity to the works will be informed in advance.

The comprehensive turbine delivery procedure which will be implemented between the Port of Waterford (Belview) and the Site will include safety procedures and Garda escort in accordance with the Traffic Management Plan.

The procedure will avoid impact on the roads involved with the TDR including the N29, N25, N72, R672 and local roads leading to the site. It is likely that turbine delivery will take place outside of regular travelling/commuting hours in order to avoid potential traffic impacts on major routes.

A Construction Waste Management Plan has been prepared for the Proposed Development in line with the ”Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects” (2021) as published by the Department of the Environment, Community and Local Government and supported by the Southern Region Waste Management Plan 2015-2021.

The Waste Management Plan will be finalised in accordance with the CEMP following the appointment of the contractor for the main construction works and will take cognisance of any newly published waste management policy.

17.2.2 Telecommunications and Broadcasting

Mitigation measures consist of mitigation by design to avoid impacts on telecommunication links. As there is no potential for electromagnetic interference from the Proposed Development on telecommunications, there are no mitigation measures proposed for the construction, operation, or decommissioning phase of the Proposed Development.

There is potential for broadcasting to be affected at receivers close to the Site during the operational phase, i.e. nearby dwellings. Mitigation by design has achieved a setback of over c. 800m between the proposed turbines and the nearest dwelling which will reduce potential effects on receivers.

The GCR will be left in situ underground within the public roadway. In advance of the main grid connection works an assessment will be carried out to confirm the precise alignment of the cable route within the corridor.

Overhead telecommunication lines along the TDR will be briefly disconnected during turbine delivery during the construction and decomissioning phase. Any interference to service will be brief (lasting less than 1 day) and potential effects to service will be communicated in advance to those affected. Notice will be provided to all stakeholders affected prior to works commencing.

17.2.2.1 Aviation

In line with standard practice for wind farm developments, the coordinates and elevations for turbines will be supplied to the IAA at the end of the construction phase. An aeronautical obstacle lighting scheme will be agreed with IAA in line with IAA’s consultation response and applied to the proposed turbines.

18. INTERACTIONS OF THE FOREGOING

This Chapter considers the potential for interactions and inter-relationships between one aspect of the environment and another which can result in an impact being either positive or negative, as well as having varying significance. The chapter considers potential significant environmental effects that may occur in terms of the interaction and inter-relationships of *Air Quality & Climate, Noise & Vibration, Biodiversity, Ornithology, Soils, Geology and Hydrogeology, Hydrology and Water Quality & FRA, Population and Human Health, Shadow Flicker, Traffic & Transportation, Archaeological, Architectural & Cultural Heritage and Landscape & Visual Impact*, as a result *of the Proposed Development as described* in Chapter 2: *Development Description* of this EIAR.

Table 18-1, below, provides a matrix detailing the key interactions and inter-relationships between the key environmental aspects of the Proposed Development, including the wind farm, grid connection route and turbine delivery route.

Each individual chapter of the EIAR has had regard to interactions between different potential impacts. For example, *Hydrology and Water Quality & FRA has had regard to potential impacts on Biodiversity; and Land, Soils and Geology* has had regard to potential impacts on both *Biodiversity, Hydrology and Water Quality & FRA and Traffic & Transportation*.

Table 18-1: Matrix of Interaction Between key Environmental Aspects

	Air Quality &Climate	Noise & Vibration	Biodiversity	Ornitology	Soils, Geology and Hydrogeology	Hydrology and Wat er Quality& FRA	Population and Human Health	Shadow Flicker	Traffic & Transportation	Archaeological, Architectural & Cultural	Landscape & Visual Impact	Material Assets, Telecommunications and viation
Air Quality & Climate												
Noise & Vibration												
Biodiversity												
Ornithology												
Soils, Geology and Hydrogeology												
Hydrology and Water Quality & FRA												
Population and Human Health												
Shadow Flicker												
Traffic & Transportation												
Archaeological, Architectural &												

	Air Quality &Climate	Noise & Vibration	Biodiversity	Ornitology	Soils, Geology and Hydrogeology	Hydrology and Wat er Quality& FRA	Population and Human Health	Shadow Flicker	Traffic & Transportation	Archaeological, Architectural & Cultural	Landscape & Visual Impact	Material Assets, Telecommunications and viation
Cultural Heritage												
Landscape & Visual Impact												
Material Assets, Telecommunications and Aviation												

= interaction or inter-relationship = no interaction or inter-relationship

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