5. POPULATION AND HUMAN HEALTH

5.1 Introduction

This section of the Environmental Impact Assessment Report (EIAR) identifies, describes and assesses the potential effects of the Prospective Development on population and human health and has been completed in accordance with the Environmental Impact Assessment (EIA) guidance and legislation set out in Chapter 1: Introduction. The full description of the Prospective Development is provided in Chapter 4 of this EIAR.

As detailed in Section 1.1.1 in Chapter 1, for the purposes of this EIAR, the various development components are described and assessed using the following references: 'Subject Development', 'Existing Development', 'Prospective Development', 'Permitted Development', 'Site', 'Wind Farm Site', 'Grid Connection Site', 'BMEP Site', 'Grid Connection', ' November 2020 Peat Slide', '2017 EIAR' and 'proposed turbines'.

One of the principal concerns during the development process is that human beings, as individuals or communities, should experience no significant diminution of their quality of life from the direct, indirect or cumulative effects arising from the construction, operation and decommissioning of a development. Ultimately, all the effects of a development impinge on human beings, directly and indirectly, positively and negatively. The key issues examined in this chapter of the EIAR include population, human health, employment and economic activity, land use, residential amenity (including visual amenity, shadow flicker and noise), community facilities and services, tourism, property values, traffic and health and safety.

5.1.1 Statement of Authority

This chapter of the EIAR has been prepared by Robert Kennedy and Keelin Bourke and reviewed by Sean Creedon, all of MKO.

Robert is a Project Environmental Scientist working as part of MKO's Renewables Team, with over 4 years' experience, having joined the company in June 2022. Robert holds a BSc in Environmental Biology and an MSc in Environmental Policy, both from University College Dublin. Robert's key strengths and areas of expertise are in project management, environmental impact assessment, renewable energy, report writing, and research. Since joining MKO, Robert has worked with and coordinated large multi-disciplinary teams involved in the production of EIA Reports for large-scale renewable energy developments. Robert's experience spans a broad range of wind energy developments, including applications for new onshore and offshore wind farms, lifetime extension and repowering projects, and substitute consent. Robert also played a key role in developing MKO's new service offering around Biodiversity Net Gain and other nature-positive mechanisms. Prior to taking up his position with MKO, Robert worked in various roles in Canada and Ireland, giving him a broad mix of skills and experience to apply to his current role with MKO. Robert also holds a membership with the Institute of Sustainability and Environmental Professionals (ISEP).

Keelin is an Environmental Scientist with MKO, with over 2 years' experience in private consultancy, having joined the company in September 2023. Keelin holds a BSc (Hons) in Environmental Science from University College Cork and an MSc (Dist) in Environmental Engineering from Trinity College Dublin. Keelin's current key strengths and areas of expertise are in environmental mapping, environmental surveying, and environmental report writing. Keelin has experience in conducting environmental impact assessment reports of a broad range of topics, including population and human health assessments, air quality assessments, assessments of built services and infrastructure and major accidents and natural disaster risk assessments for both onshore and offshore wind energy projects. Prior to taking up her position with MKO, Keelin worked as an Environmental Health and Safey

Officer in an EPA licensed Waste Transfer Facility in Cork City. Since joining MKO, Keelin has become a member of the MKO Environmental Renewables Team and has been involved in preparing and managing Environmental Impact Assessments and in leading large multi-disciplinary teams in order to produce robust Environmental Impact Assessment Reports for large-scale onshore and offshore wind energy developments.

Sean Creedon is an Associate Director in the Environment Team at MKO. He leads a team of highly skilled environmental professionals working on EIAR for large-and medium scale Renewable Energy infrastructure. Sean has directed and overseen multiple renewable energy projects across wind, solar, battery, biogas and hydrogen as well as a range of thermal and other energy related developments. He has worked on the planning and environmental impact elements within all stages of wind farm project delivery. Sean's professional experience includes the development and management of a portfolio of wind farm developments to the consenting decision. He is a member of the MKO senior management team. Sean has over 22 years' experience in program and project development, holds an MSc from NUI Galway and a Diploma in Project Management from Institute of Project Management Ireland.

5.1.2 Relevant Guidelines and Data Sources

In addition to the guidelines referred to in Section 1.2.1 and Section 1.2.2 of Chapter 1 of this EIAR, and Directive 2011/92/EU as amended by Directive 2014/52/EU, the following guidelines, plans and reports have also influenced the preparation of this chapter:

- British Horse Society (2025) *Advice on Wind Turbines and Equestrian Access.*
- Central Statistics Office (CSO) (2016, 2020, 2022) *Census of Ireland 2016; Census of Agriculture 2020; Census of Ireland 2022.*
- Department of Health (2025) *Health in Ireland: Key Trends.*
- Department of Housing, Planning and Local Government (DoHPLG) (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment.
- Department of the Environment, Heritage and Local Government (DoEHLG) (2006) Wind Energy Development Guidelines.
- Department of the Environment, Heritage and Local Government (DoEHLG) (2019) Draft Wind Energy Development Guidelines.
- Environmental Protection Agency (EPA) (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.
- Donegal County Council (2024) *Donegal County Development Plan 2024–2030*
- Environmental Protection Agency (US EPA) (2014) *Framework for Human Health Risk Assessment to Inform Decision Making.*
- Fáilte Ireland (2023) *EIAR Guidelines for the Consideration of Tourism and Tourism Related Projects.*
- Institute for Environmental Management and Assessment (IEMA) (2022a) *Health in Environmental Impact Assessment: A Primer for a Proportionate Assessment.*
- Institute for Environmental Management and Assessment (IEMA) (2022b) *Determining Significance for Human Health in Environmental Impact Assessment.*
- Institute of Public Health Ireland (2021) *Health Impact Assessment Guidance.*
- Irish Wind Energy Association (IWEA) (2012) *Best Practice Guidelines for the Irish Wind Energy Industry.*
- IWEA (2012).*Best Practice Guidelines for the Irish Wind Energy Industry*.
- National Roads Authority / Transport Infrastructure Ireland (2008) *Environmental Impact Assessment of National Road Schemes: A Practical Guide (Revision 1).*
- United States Environmental Protection Agency (US EPA) (2016) *Health Impact Assessment Resource and Tool Compilation.*
- World Health Organization (WHO) (2022) *Environmental Noise Guidelines for the European Region.* Available at: https://www.who.int/

5.1.3 Scoping and Consultation

Chapter 2 of this EIAR describes the scoping and consultation exercise undertaken for the Subject Development. Scoping was originally conducted for the Subject Development in September 2025, due to the time that had passed and updates which were made as the design progressed, a further follow up round of Scoping occurred in March 2026 to all consultees which were originally contacted. Relevant to this chapter, responses were received from the Health Service Executive (HSE), Uisce Éireann & Fáilte Ireland. As part of the EIAR scoping and consultation exercise, MKO contacted the relevant national and regional broadcasters, fixed and mobile telephone operators, aviation authorities and other relevant consultees in May 2025 including the IAA and 2RN; please see Section 15.2.2 of Chapter 15 for further details.

Health Service Executive

A scoping response was received from the Health Service Executive (HSE) on the 3rd October 2025. The HSE responded to the follow up round of scoping in April 2026 to state that they had no further comments. The HSE requested a shadow flicker assessment is undertaken to identify any sensitive receptors which may be impacted by shadow flicker, that potential impacts for noise and vibration from the proposed development on all noise sensitive locations must be clearly identified, a detailed assessment of the current ground stability of the site for the proposed windfarm development, potential impacts on surface and groundwater quality including drinking water sources, and noted that the EIAR must include all proposed mitigation measures. The HSE also noted that the assessment should include the impact construction work may have on the future stability of ground conditions, taking into consideration extreme weather events, site drainage and the potential for soil erosion. The HSE stated that a Construction Environmental Management Plan (CEMP) should be included in the EIAR which details dust control and mitigation measures. The HSE further stated that the EIAR should examine all likely significant impacts and provide the following information for each:

- Description of the receiving environment;
- The nature and scale of the impact;
- An assessment of the significance of the impact;
- Proposed mitigation measures;
- Residual impacts.

Directive 2014/52/EU has an enhanced requirement to assess likely significant impacts on Population and Human Health. It is the experience of the Environmental Health Service (EHS) that impacts on human health are often inadequately assessed in EIAs in Ireland. It is recommended that the wider determinants of health and wellbeing are considered in a proportionate manner when considering the EIA. Guidance on wider determinants of health can be found at www.publichealth.ie

The HSE advised that in addition to any likely significant negative impacts from the Subject Development, any positive likely significant impacts should also be assessed.

The below table lists the topics which the Environmental Health Service (EHS) recommends are included and assessed in the EIAR and rEIAR, and the location of the EIAR and rEIAR in which they are assessed in detail:

Table 5-1 Topics to be addressed as per HSE Scoping Response

Topic	Location of EIAR/rEIAR
Public Consultation	Chapter 5 (this Chapter, multiple Sections), Chapter 5 of the rEIAR (multiple Sections), Chapter 4 Description of the Prospective Development, Chapter 4 of the

	rEIAR Description of the Existing Development, Appendix 2-1 Community Engagement Report
Decommissioning phase of the Proposed Wind Farm	Relevant Section of each EIAR Chapters 4-18, Appendix 4-6 Decommissioning Plan
Siting and location of turbines	Chapter 4 Description of the Prospective Development, Chapter 4 of the rEIAR Description of the Existing Development
Noise & Vibration	Chapter 5 (this Chapter, multiple Sections), Chapter 5 of the rEIAR (multiple Sections), Chapter 12 Noise and Vibration of this EIAR, Chapter 12 Noise and Vibration of the rEIAR
Shadow Flicker	Chapter 5 (this Chapter, multiple Sections)
Air Quality	Chapter 5 (this Chapter, multiple Sections), Chapter 5 of the rEIAR (multiple Sections), Chapter 10 Air Quality, Chapter 10 of the rEIAR Air Quality
Surface and Groundwater Quality	Chapter 5 (this Chapter, multiple Sections), Chapter 5 of the rEIAR (multiple Sections), Chapter 9 Hydrology and Hydrogeology, Chapter 9 of the rEIAR Hydrology and Hydrogeology
Geological Impacts	Chapter 5 (this Chapter, multiple Sections), Chapter 5 of the rEIAR (multiple sections), Chapter 8 Land, Soils and Geology, Chapter 8 of the rEIAR Land, Soils and Geology, Appendix 8-1 Geotechnical and Peat Stability Report, Appendix 8-1 of the rEIAR Retrospective Geotechnical and Peat Stability Report.
Ancillary facilities	Chapter 4 Description of the Prospective Development, Chapter 4 of the rEIAR Description of the Existing Development
Cumulative impacts	Relevant Section of each EIAR Chapters 2-18, Relevant Section of each rEIAR Chapters 2-18

Uisce Éireann

A scoping request was issued to Uisce Éireann on the 5th September 2025 and a response was received on the 6th October 2025 (dated 3rd October 2025), outlining that there were no water mains, sewage links or waste water network within the Wind Farm Site. A data request was sent to Uisce Éireann in April 2026. The data provided included the water distribution network and sewerage network in the vicinity of the Site. Uisce Eireann also outlined that the following items should be considered in the EIAR and rEIAR.

Table 5-2 Topics to be addressed as per Uisce Éireann Scoping Response, relevant to this chapter

Topic	Location in EIAR/rEIAR
Where the development proposal has the potential to impact an Uisce Éireann Drinking Water Source(s), the applicant shall provide details of measures to be taken to ensure that there will be no negative impact to Uisce Éireann's Drinking Water Source(s) during the construction and operational phases of the development.	Chapter 5 (this Chapter, multiple Sections), Chapter 5 of the rEIAR (multiple Sections), Chapter 9 Hydrology and Hydrogeology, Chapter 9 of the rEIAR Hydrology and Hydrogeology, and Chapter 15 Material Assets, Chapter 15 of the rEIAR Material Assets
Where the development proposes the backfilling of materials, the applicant is required to include a waste sampling strategy to ensure the material is inert	Chapter 5 (this Chapter, multiple Sections), Chapter 5 of the rEIAR (multiple Sections), Chapter 9 Hydrology and Hydrogeology, Chapter 9 of the rEIAR Hydrology and Hydrogeology and Chapter 15 Material Assets, Chapter 15 of the rEIAR Material Assets
Mitigations should be proposed for any potential negative impacts on any water source(s) which may be in proximity and included in the environmental management plan and incident response.	Chapter 5 (this Chapter, multiple Sections), Chapter 5 of the rEIAR (multiple Sections), Chapter 9 Hydrology and Hydrogeology, Chapter 9 of the rEIAR Hydrology and Hydrogeology and Chapter 15 Material Assets, Chapter 15 of the rEIAR Material Assets
Any and all potential impacts on the nearby reservoir as public water supply water source(s) are assessed, including any impact on hydrogeology and any groundwater/ surface water interactions.	Chapter 5 (this Chapter, multiple Sections), Chapter 5 of the rEIAR (multiple Sections), Chapter 9 Hydrology and Hydrogeology, Chapter 9 of the rEIAR Hydrology and Hydrogeology and Chapter 15 Material Assets, Chapter 15 of the rEIAR Material Assets
Impacts of the development on the capacity of water services (i.e. do existing water services have the capacity to cater for the new development). This is confirmed by Uisce Éireann in the form of a Confirmation of Feasibility (COF). If a development requires a connection to either a public water supply or sewage collection system, the developer is advised to submit a Pre-Connection Enquiry (PCE) enquiry to Uisce Éireann to determine the feasibility of connection to the Uisce Éireann network.	Chapter 5 (this Chapter, multiple Sections), Chapter 5 of the rEIAR (multiple Sections), Chapter 9 Hydrology and Hydrogeology, Chapter 9 of the rEIAR Hydrology and Hydrogeology and Chapter 15 Material Assets, Chapter 15 of the rEIAR Material Assets
The applicant shall identify any upgrading of water services infrastructure that would be required to accommodate the proposed development.	Chapter 5 (this Chapter, multiple Sections), Chapter 5 of the rEIAR (multiple Sections), Chapter 9 Hydrology and Hydrogeology, and Chapter 15 Material Assets, Chapter 15 of the rEIAR Material Assets

Fáilte Ireland

A scoping response was received from Fáilte Ireland on the 21st October 2025 and provided '*Fáilte Ireland's Guidelines for the Treatment of Tourism in an EIA 2023*', to inform the preparation of the EIAR for Subject Development. The report provides guidance for those conducting EIA and compiling an EIAR, or those assessing EIARs, where the project involves tourism or may have an impact upon tourism (see Section 5.3.2, Section 5.4.2.1.5, and Section 5.4.3.1.5 for further detail of the EIAR, and Section 5.3.2, Section 5.4.2.1.4 of the rEIAR).

5.2 Assessment Methodology

5.2.1 Population

A desk-based assessment using sources and guidelines referenced in Section 5.1.2 above was undertaken to examine relevant information pertaining to the population impact assessment. Information on population statistics, employment and social data for the relevant Electoral Divisions (EDs) were obtained from the Central Statistics Office (CSO) for census years 2016 and 2022. Fáilte Ireland's EIAR Guidelines for the Consideration of Tourism and Tourism Related Projects, the Donegal County Development Plan 2024 – 2030, and any other literature pertinent to the area was also considered in this assessment. See Section 5.3.2 below.

In order to assess the population in the vicinity of the Prospective Development, the Population Study Area for this population assessment focuses on the EDs within which the Site (Wind Farm Site, Grid Connection Site and BMEP Site) lies, namely Knock, Goland, Clogher, Tawnawully and Dooish, but it also refers to county and national statistics. Super Output Areas within Northern Ireland have not been included in the Population Study Area, however transboundary effects of the Subject Development are assessed in Section 5.8 below.

5.2.2 Human Health

This human health analysis section was assessed using guidelines set out in Section 5.1.2 above.

The World Health Organisation (WHO) defines health as:

> "*A state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*".[4]

5.2.2.1 National Guidance

The Environmental Protection Agency (EPA) '*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*[1]' (hereafter referred to as 'EPA, 2022') advise that "*in an EIAR, the assessment of impacts on population and human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in this EIAR e.g., under the environmental factors of air, water, soil etc.*" Environmental impacts from the Prospective Development which may also have an impact on population and human health are discussed in this chapter but addressed in more detail in the following chapters: Chapter 8 Land Soil and Geology, Chapter 9 Hydrology and Hydrogeology, Chapter 10 Air Quality, Chapter 11 Climate, Chapter 12 Noise and Vibration, Chapter 13 Landscape and Visual, Chapter 14 Cultural Heritage, Chapter 15 Material Assets (including Traffic and Transport).

[1] *EPA (2022) Guidelines on the information to be contained in Environmental Impact Assessment Reports* <https://www.epa.ie/publications/monitoring--assessment/assessment/guidelines-on-the-information-to-be-contained-in-environmental-impact-assessment.php>

As referenced in the Department of Housing, Planning and Local Government (2018) *Guidelines for Planning Authorities and An Bord Pleanála*, (taken from the European Commission's '*Environmental Impact Assessment of Projects: Guidance on the Preparation of the Environmental Impact Assessment Report'* (2018)), human health is "*a very broad factor that would be highly project dependent.*" The report continues on stating that:

> '** The notion of human health should be considered in the context of the other factors in Article 3(1) of the EIA Directive and thus environmentally related health issues (such as health effects caused by the release of toxic substances to the environment, health risks arising from major hazards associated with the Project, effects caused by changes in disease vectors caused by the Project, changes in living conditions, effects on vulnerable groups, exposure to traffic noise or air pollutants) are obvious aspects to study. In addition, these would concern the commissioning, operation, and decommissioning of a Project in relation to workers on the Project and surrounding population.*'

EPA, 2022 also states that "*while no specific guidance on the meaning of the term Human Health has been issued in the context of Directive 2014/52/EU, the same term was used in 3.3.6 the SEA Directive (2001/42/EC). The Commission's SEA Implementation Guidance states 'The notion of human health should be considered in the context of the other issues mentioned in paragraph (f)*'" of the Directive, where paragraph f lists environmental factors such as soils, water, landscape, air etc. EPA, 2022 further states that this approach is '*consistent with the approach set out in the 2002 EPA Guidelines where health was considered through assessment of the environmental pathways through which it could be affected*'. EPA, 2022 notes that the above approach follows the 2002 EPA guidelines already in place which details the following:

> *'The evaluation of effects on these pathways is carried out by reference to accepted standards (usually international) of safety in dose, exposure or risk. These standards are in turn based upon medical and scientific investigation of the direct effects on health of the individual substance, effect or risk. This practice of reliance upon limits, doses and thresholds for environmental pathways, such as air, water or soil, provides robust and reliable health protectors [protection criteria] for analysis relating to the environment'.*

5.2.2.2 IEMA Guidance 2017

The Institute of Sustainability and Environmental Professionals (ISEP) formally known as the Institute for Environmental Management and Assessment (IEMA) published '*Health In Environmental Impact Assessment: A Primer for a Proportionate Assessment*' in 2017 (hereafter referred to as the Primer Assessment Report) examining what a proportionate assessment of the impacts on health should be in Environmental Impact Assessments. The document states that Health Impact Assessment (HIA) and EIA are separate processes.

> *'HIA is defined as a combination of procedures, methods and tools that systematically judges the potential, and sometimes unintended, effects of a policy, plan, programme or project on both the health of a population and the distribution of those effects within the population. HIA identifies appropriate actions to manage those effects... [...] ... HIA can inform EIA practice in relation to population and human health but conducting a HIA will not necessarily meet the EIA population and human health requirement. By the same token, conducting an EIA will not automatically meet the requirements of a HIA.'*

The Primer Assessment Report acknowledges that *'disproportionate burdens may be placed on developers if HIA is applied as a proxy for the consideration of population and human health in every future UK EIA'.* The focus of EIA should be on predicting health and wellbeing outcomes, rather than focusing on changes in determinants of health e.g., expected changes in noise levels. Determining the significance of impacts on population and human health should include a professional judgement, scientific literature; consultation responses; comparison with baseline conditions; local health priorities;

and national/international regulatory standards and guidelines. The Primer Assessment Report refers to the WHO 2014 which provides an overview of health in different types of assessment:

> *"The health sector, by crafting and promoting HIA, can be regarded as contributing to fragmentation among impact assessments. Health issues can, and need to, be included [in impact assessment] irrespective of levels of integration. At the same time, from a civic society perspective, it would be unacceptable for HIA to weaken other impact assessments. A prudent attitude suggests optimizing the coverage of health along all three avenues:*
>
> - *better consideration of health in existing impact assessments other than HIA;*
> - *dedicated HIA;*
> - *and integrated forms of impact assessment."*

As such, the WHO does not support a stand-alone HIA unless it could be demonstrated to be of advantage over an EIAR. Therefore, given that this human health assessment is part of the EIAR; there is no stand-alone HIA.

5.2.2.3 EIA Significance Matrix for Human Health, IEMA Guidance 2022

The IEMA Working Group 2022 published '*Determining Significance For Human Health In Environmental Impact Assessment*'[2] in response to gaps and inconsistencies across existing guidance documents as to how health is assessed in EIA, particularly with regard to significance. The aim of this report is to assist and streamline discussions for consultants producing the assessments and for the decision makers who are reviewing the assessments. The report states that an EIA must identify, describe and assess the direct and indirect significant effects in an appropriate manner of a proposed development on human health. It must include the information that may reasonably be required for reaching a reasoned conclusion on the significant effects, taking into account current knowledge and methods of assessment.

A wind farm is not a recognised source of pollution. It is not an activity which requires EPA licensing under the Environmental Protection Agency Act 1992, as amended. As such, a wind farm is not considered to have ongoing significant emissions to environmental media and the subsequent potential for human health effects. In this context, and aligned with the above noted ISEP Guidance, this EIAR provides sufficient information that may reasonably be required for reaching a reasoned conclusion on the significance of effects, without providing the level of detail, for example through the use of the significance matrix set out in the ISEP Guidance, which might be required for an assessment of effects on human health arising from a type of development with a potential for emissions-related human health effects.

5.2.3 Shadow Flicker

5.2.3.1 Background

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

[2] *IEMA Working Group (2022) Determining Significance for Human Health in Environmental Impact Assessment. Available at: https://www.iema.net/media/yljb2nbs/iema-eia-guide-to-determining-significance-for-human-health-nov-2022.pdf*

The frequency of occurrence and the strength of any potential shadow flicker effect depends on several factors, each of which is outlined below.

1. *Whether the sunlight is direct and unobstructed or diffused by clouds:*

If the sun is not shining, shadow flicker cannot occur. Reduced visibility conditions such as clouds, haze, and fog greatly reduce the chance of shadow flicker occurring.

'*Cloud amounts are reported as the number of eights (okta) of the sky covered. Irish skies are completely covered by cloud (8 oktas) for over 50% of the time. The mean cloud amount for each hour is between five and six okta. This is due to Ireland's geographical position off the northwest of Europe, close to the path of Atlantic low-pressure systems which tend to keep the country in humid, cloudy airflows for much of the time. A study at 12 stations over a 25-year period showed that the mean cloud amount was at a minimum in April and maximum in July. Cloud amounts were less at night than during the day, with the mean minimum occurring roughly between 2100 and 0100 GMT and the mean maximum occurring between 1000 and 1500 GMT at most stations.*'[3]

2. *The presence of intervening obstructions between the turbine and the observer:*

For shadow flicker to occur, the windows of a potentially affected property must have direct visibility of a wind turbine, with no physical obstructions such as buildings, trees and hedgerows, hills or other structures located on the intervening land between the window and the turbine.

Any obstacles such as trees or buildings located between a property and the wind turbine will reduce or eliminate the occurrence and/or intensity of the shadow flicker.

3. *How high the sun is in the sky at a given time:*

At distances of greater than approximately 500m between a turbine and a receptor, shadow flicker generally occurs only at sunrise or sunset when the shadow cast by the turbine is longer. The Guidelines (DoEHLG, 2006) iterates that at distances greater than 10 rotor diameters from a turbine, the potential for shadow flicker is very low.

Figure 5-1 illustrates the shadow cast by a turbine at various times during the day; the red shading represents the area where shadow flicker may occur. When the sun is high in the sky, the length of the shadow cast by the turbine is significantly shorter.

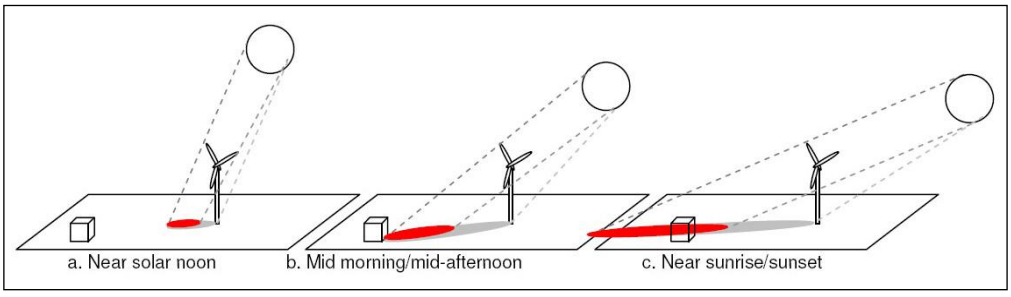

Figure 5-1 Shadow-Prone Area as Function of Time of Day (Source: Shadow Flicker Report, Helimax Energy, Dec 2008)

4. *Distance and bearing, i.e. where the property is located relative to a turbine and the sun:*

The further a property is from the turbine the less pronounced the effect will be. There are several reasons for this: there are fewer times when the sun is low enough to cast a long shadow; when the sun is low it is more likely to be obscured by either cloud on the horizon or intervening buildings and

[3] *Met Éireann, www.met.ie*

vegetation; and the centre of the rotor's shadow passes more quickly over the land reducing the duration of the effect.

At a distance, the turbine blades do not cover the sun but only partly mask it, substantially weakening the shadow. This impact occurs first with the shadow from the blade tip, the tips being thinner in section than the rest of the blade. The shadows from the tips extend the furthest and so only a very weak impact is observed at distance from the turbines. [4]

5. *Property usage and occupancy:*

Where shadow flicker is predicted to occur at a specific location, this does not imply that it will be witnessed. Potential occupants of a property may be sleeping or occupying a room on another side of the property that is not subject to shadow flicker or completely absent from the location during the time of shadow flicker events. As shadow flicker usually occurs only when the sun is at a low angle in the sky, i.e. very early in the morning after sunrise or late in the evening before sunset, even if there is a bedroom on the side of the property affected, the shadow flicker may not be witnessed if curtains or blinds in the bedroom are closed. It should be noted that the below assessment considers a theoretical precautionary worst-case assessment as detailed in Section 5.3.8.1 below.

6. *Wind direction, i.e. position of the turbine blades:*

The direction of wind turbine blades changes according to wind direction, as the turbine rotor turns to face the wind. In order to cast a shadow, the turbine blades must be facing directly toward or away from the sun, so they are moving across the source of the light relative to the observer. This is demonstrated in Figure 5-2 below.

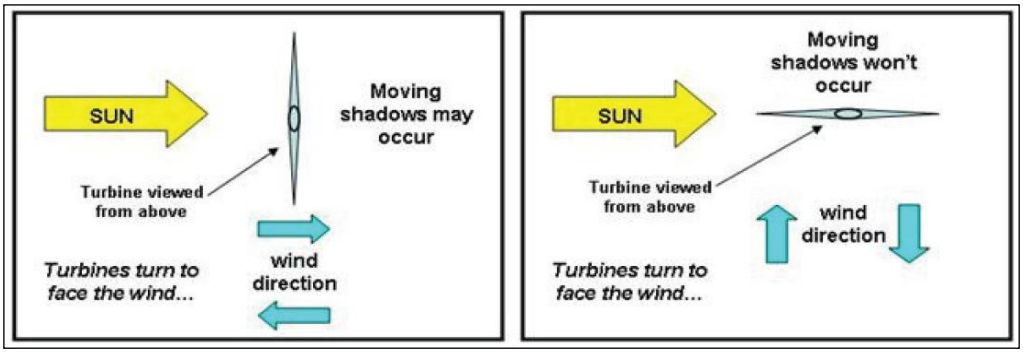

Figure 5-2 Turbine Blade Position and Shadow Flicker Impact (Source: Wind Fact Sheet: Shadow Flicker, Noise Environment Power LLC)

7. *Rotation of turbine blades:*

Shadow flicker occurs only if there is sufficient wind for the turbine blades to be continually rotating. Wind turbines begin operating at a specific wind speed referred to as the 'cut-in speed', i.e. the speed at which the turbine produces a net power output, and they cease operating at a specific 'cut-out speed'. Therefore, even during the sunlight hours when shadow flicker has been predicted to occur, if the turbine blades are not turning due to insufficient wind speed, then no shadow flicker will occur.

5.2.3.2 Guidance

The current adopted guidance for shadow flicker in Ireland is derived from the Guidelines (DoEHLG, 2006) and the '*Best Practice Guidelines for the Irish Wind Energy Industry*' (Irish Wind Energy Association, 2012). The Guidelines (DoEHLG, 2006) state that at distances greater than 10 rotor

[4] *Update of Shadow Flicker Evidence Base, UK Department of Energy and Climate Change, 2010. Available at: https://assets.publishing.service.gov.uk/media/5a79770bed915d0422068aa3/1416-update-uk-shadow-flicker-evidence-base.pdf*

diameters from a turbine, the potential for shadow flicker is very low. Therefore, the study area adopted for the shadow flicker assessment is 10 rotor diameters of the proposed turbine locations (i.e. for the Prospective Development, this is assumed at 1.33 km based on a maximum rotor diameter of 133 metres, hereafter referred to as the 'Shadow Flicker Study Area').

The Guidelines (DoEHLG, 2006) recommend that shadow flicker at neighbouring offices and dwellings within 500 metres of a proposed turbine location should not exceed a total of 30 hours per year or 30 minutes per day.

The Guidelines (DoEHLG, 2006) state that shadow flicker lasts only for a short period of time and occurs only during certain specific combined circumstances, as follows:

- The sun is shining and is at a low angle in the sky, i.e. just after dawn and before sunset, **and**
- The turbine is located directly between the sun and the affected property, **and**
- There is enough wind energy to ensure that the turbine blades are moving, **and**
- The turbine blades are positioned so as to cast a shadow on the receptor.

Although the Guidelines (DoEHLG, 2006) threshold applies to properties located within 500 metres of a proposed turbine location, for the purposes of this assessment, the thresholds of 30 hours per year or 30 minutes per day have been applied to all properties located within the Shadow Flicker Study Area i.e. 10 rotor diameters of the proposed turbines (1.33km in this case) of the proposed turbines (as per '*Best Practice Guidelines for the Irish Wind Energy Industry*', IWEA, 2012).

The Guidelines (DoEHLG, 2006) are currently under review. the DoEHLG released the '*Draft Revised Wind Energy Development Guidelines'* (hereafter referred to as the Draft Guidelines (DoHPLG, 2019)) for public consultation in December 2019. The consultation period closed February 2020; however, no update or final guidelines was released. The Draft Guidelines (DoHPLG, 2019) recommend local planning authorities and/or An Coimisiún Pleanála impose conditions to ensure that:

> *"no existing dwelling or other affected property will experience shadow flicker as a result of the wind energy development subject of the planning application and the wind energy development shall be installed and operated in accordance with the shadow flicker study submitted to accompany the planning application, including any mitigation measures required."*

The Draft Guidelines (DoHPLG, 2019) are based on the recommendations set out in the '*Proposed Revisions to Wind Energy Development Guidelines 2006 – Targeted Review'* (December 2013) and the '*Review of the Wind Energy Development Guidelines 2006 – Preferred Draft Approach*' (June 2017)[5].

In the Annex of Actions[6] for Climate Action Plan 2024 (CAP24), published in December 2023, Action EL/24/5 states that revised wind energy development guidelines for onshore wind will be published in Q1 2025. This Action was not completed under CAP 2024 and has been carried over into the Annex of Actions for CAP25[7] as a Legacy Action. The shadow flicker methodology and assessment within this chapter are based on compliance with the Guidelines (DoEHLG, 2006), which remain to be the current adopted guidelines, under Section 28 of the Planning Development Act 2000 (as amended). However, it should also be noted the proposed turbines can be brought in line with the requirements of the Draft

[5]*Proposed Revisions to Wind Energy Development Guidelines 2006 – Targeted Review' (December 2013) and the 'Review of the Wind Energy Development Guidelines 2006 – Preferred Draft Approach' (June 2017). Available at:* https://ie.rwe.com/-/media/RWE/RWE-Ireland/downloads/lyre/preferred-draft-approach-to-wind-energy-guidelines.pdf
[6]*Department of the Environment Climate and Communications (2024) CAP24 Annex of Actions. Available at:* https://assets.gov.ie/static/documents/climate-action-plan-2024-annex-of-actions-e61eb692-dbcb-489a-a9aa-7b7d6155b4c2.pdf
[7]*Department of the Environment Climate and Communications (2025) CAP25 Annex of Actions. Available at:* https://assets.gov.ie/static/documents/Climate_Action_Plan_2025_-_Annex_of_Actions.pdf

Guidelines (DoHPLG, 2019) (should they be implemented as currently drafted) through the stricter implementation of the mitigation measures outlined in Section 5.4.3.2.7.

5.2.3.3 Shadow Flicker Prediction Methodology

Shadow flicker occurs only under certain, combined circumstances, as detailed above. Where shadow flicker does occur, it is generally short-lived. The Guidelines (DoEHLG, 2006) state that careful site selection, design and planning, and good use of relevant software can help avoid the possibility of shadow flicker, all of which have been employed in the design of the Wind Farm Site. Proper siting of wind turbines is key in eliminating the impact of shadow flicker.

The occurrence of shadow flicker can be precisely predicted using specialist computer software programmes specifically developed for the wind energy industry, such as WindFarm (ReSoft), WindFarmer (DNV.GL), AWS OpenWind, or WindPRO: Shadow. The computer modelling of the occurrence and magnitude of shadow flicker is made possible by the fact that the sun rises and sets in the same position in the sky on every day each year.

Digital Terrain Modelling (DTM) was used to determine the approximate ground elevation at which the wind turbines and surrounding properties are located for the purpose of running the model. The use of DTM data ensures that realistic elevation variations between the turbines and properties is accounted for.

Any potential shadow flicker impact can be precisely modelled to give the start and end time (accurate to the second) of any incidence of shadow flicker, at any location, on any day or all days of the year when it might occur. Where a shadow flicker impact is predicted to occur, the total maximum daily and annual durations can be predicted, along with the total number of days. Any incidence of predicted shadow flicker can be attributed to a particular turbine or group of turbines to allow effective mitigation strategies to be planned and proposed if the model indicates that an exceedance of the shadow flicker guideline limit might occur, as detailed further below.

For the purposes of this shadow flicker assessment, the software package WindPRO: Shadow – Version 4.0.552 (August 2024) has been used to predict the level of shadow flicker associated with the Prospective Development. WindPRO is a commercially available software tool that enables developers to analyse, design and optimise proposed wind farms. It allows proposed turbine layouts to be optimised for maximum energy yield whilst taking account of environmental, planning and engineering constraints.

5.2.3.4 Shadow Flicker Assessment Criteria

The proposed wind turbines to be installed on the Wind Farm Site will have a ground-to-blade tip height, hub height and blade length of the following:

- Turbine Tip Height –156.5 metres
- Hub Height – 90 metres
- Rotor Diameter – 133 metres

Planning permission is being sought for a turbine with a tip height of 156.5m. The potential shadow flicker impacts the Prospective Development will give rise to is no more than that predicted in this assessment using the proposed rotor diameter of 133m. With the benefit of the mitigation measures outlined in Section 5.4.3.2.7, the turbine to be installed onsite will be able to comply with the Guidelines (DoEHLG, 2006) thresholds of 30 minutes per day or 30 hours per year, and if necessary with the Draft Guidelines (DoHPLG, 2019) through the use of mitigation measures, including turbine control software where necessary.

5.2.3.5 Shadow Flicker Study Area

As part of the original Planning Application and 2017 EIAR all sensitive receptors within c.2km of the area suitable for siting wind turbines were identified and mapped. This included all inhabitable and uninhabitable properties. In addition, at the outset of the Prospective Development, an updated search of all sensitive receptors was carried out, including a planning history search to identify properties that may have been granted planning permission, but not yet been constructed. Any property with a valid planning permission for a dwelling house was also added to the sensitive receptors' dataset which was updated in June 2026.

The Shadow Flicker Study Area for the shadow flicker assessment is ten times rotor diameter (133m rotor diameter x 10 = 1.33km). The Guidelines (DoEHLG, 2006) note that, at distances greater than 10 times the rotor diameter of a proposed turbine, the potential for shadow flicker is very low, and in recent years, a shadow flicker study area of 10 times rotor diameter has been the standard practice for assessments of potential shadow flicker effects. Therefore, the Shadow Flicker Study Area is set at 1.33km from the proposed turbines. All inhabitable dwellings within 1.33km of the proposed turbines have been considered as part of the following shadow flicker assessment. There are 4 no. properties identified within Shadow Flicker Study Area, of which 3 no. are inhabitable dwellings all of which are participating properties to the Subject Development, and 1 no. which is a derelict property.

Shadow Flicker impacts on horses/stud farms/equestrian centres is commonly raised as a potential concern. In the absence of national policy or guidance in relation to shadow flicker near stud farms/equestrian centres, MKO have reviewed the British Horse Society's *'Advice on Wind Turbines and Equestrian Access*[8]. The British Horse Society policy statement states the following in relating to the siting of wind turbines in the vicinity of equine businesses:

> *The Society recommends (January 2025) a minimum separation distance of blade tip height plus 10% – 'fallover distance' or 'fallover' – between a commercial turbine, one of multiple on site, and any route used with horses and a separation distance of twice tip height for microgeneration units*

There are no registered thoroughbred stud farms or other equestrian facilities, such as stables, located within the Shadow Flicker Study Area (1.33km from the proposed turbines) or within 172.15m (Blade tip height of 156.5m + 10%) of the proposed turbines. There are 3 no. registered equestrian facilities within 20km of the Prospective Development; Drumdroit Stables located 18.7km east of T19, Glenacres Stud 18.4km north of T19, and the closest registered equine facility is Tir Chonaill Equestrian Centre and Riding Schook, located in Ballybofey, Co. Donegal, approximately 7.3km north of the nearest proposed turbine (T19), therefore, no registered thoroughbred stud farms, stables, or other equestrian facilities are included as sensitive receptors for the purposes of shadow flicker assessment. On a precautionary basis, i.e., under the assumption that every inhabitable dwelling owns a horse or horses, the closest inhabitable dwelling, not including involved properties, is located approximately 1,415 metres from the nearest proposed turbine (T19). On this basis the potential effects of shadow flicker on horses/stud farms/equestrian centres has been scoped out of this assessment.

The Shadow Flicker Study Area and sensitive receptor locations are shown in Figure 5-3, with all properties detailed in Table 5-13 in Section 5.3.8 below.

[8] *British Horse Society (2025) Advice on Wind Turbines and Equestrian Access. Available at:* https://www.bhs.org.uk/media/lgwdbphr/wind-turbines-0525.pdf

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Meenbog

Meenafea

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Croaghnagawna

Sruhangarve Bridge

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Sruhangarve

Sixth Corgary or Second Croagh

Fifth Corgary or First C

CROSS HILL

Carrynawan

Croagh Burn

Carrickaduff Lough

Carrickaduff Hill

Pollawaddy

Cross Hill

Blind Lough

Lough Nabrackboy

Loughnakinroey

Killeter

ARDN

Map Legend

- Planning Application Boundary
- Proposed Turbine Layout
- Prospective Development 1.33km Shadow Flicker Study Area
- Dwellings within Shadow Flicker Study Area

0 1.5 3 km

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Spatial Reference
Name: IRENET95 Irish Transverse Mercator
Datum: IRENET95
Projection: Transverse Mercator

SITE LOCATION - NOT TO SCALE

Drawing Title: Shadow Flicker Study Area

Project Title: Meenbog Wind Farm, Co. Donegal

Project No.	Drawing No.	Scale
240505g	5-3	1:37,000
Drawn By	Checked By	Date
SOR	RK	01/07/2026

Email: info@mkoireland.ie/ Website: www.mkoireland.ie

5.2.4 Assumptions and Limitations

5.2.4.1 Population

Population has been assessed in this EIAR using the most recent data available, guidance and best practice referenced above. No assumption or limitations were encountered during the preparation of the Section of the EIAR.

5.2.4.2 Human Health

Human Health has been assessed in this EIAR using the guidance and best practice referenced above. No assumption or limitations were encountered during the preparation of the Section of the EIAR.

5.2.4.3 Shadow Flicker

A precautionary approach has been taken in relation to the orientation of each individual property in relation to the location of the proposed wind turbines through the use of a feature called 'greenhouse mode' within the WindPRO software. This feature assumes shadows can be seen from 360 degrees at a property as opposed to only through windows facing the wind turbines.

No screening due to trees or other buildings or vegetation is assumed. It was not considered necessary or practical to measure the dimensions of every window on every property in the Shadow Flicker Study Area. While the actual size of a window will marginally influence the incidence and duration of any potential shadow flicker impact, with larger windows resulting in slightly longer shadow flicker durations, any additional incidences or durations or shadow flicker over and above those predicted in this assessment can be countered by extending the mitigation strategies outlined in Section 5.4.3.2.7.

The use of computer models to predict the amount of shadow flicker that will occur is known to produce an over-estimate of possible impact, referred to as the 'theoretical precautionary scenario', due to the following limitations:

- The sun is assumed to be shining during all daylight hours such that a noticeable shadow is cast. This will not occur in reality.
- The wind is always assumed to be within the operating range of the turbines such that the turbine rotor is turning at all times, thus enabling a periodic shadow flicker. Wind turbines only begin operating at a specific 'cut-in speed', and cease operating at a specific 'cut-out speed'. In periods where the wind is blowing at medium to high speeds, the probability of there being clear or partially clear skies where the sun is shining and could cast a shadow, is low.
- The wind turbines are assumed to be available to operate, i.e. turned on at all times. In reality, turbines may be switched off during maintenance or for other technical or environmental reasons.
- The turbine rotor is considered (as a sphere) to present its maximum aspect to observers in all directions. In reality, the wind direction and relative position of the turbine rotor would result in a changing aspect being presented by the turbine. The rotor will actually present as ellipses of varying sizes to observers from different directions. The time taken for the sun to pass across the sky behind a highly elliptical rotor aspect will be shorter than the modelled maximum aspect.

The total annual shadow flicker calculated for each property assumes 100% sunshine during daytime hours, as referred to above. However, weather data for this region shows that the sun shines on average for 29.79% of the daylight hours per year. This percentage is based on Met Éireann data recorded at Malin Head weather station over the 30-year period from 1991-2020 (www.met.ie). The Met Éireann weather station at Malin Head, Co. Donegal, which is located approximately 78 km to the north of the

Wind Farm Site, is the nearest weather and climate monitoring station to the Wind Farm Site that has meteorological data recorded for the 30-year period from 1991-2020. The Met Éireann weather station in Clones, Co. Monaghan is located a similar distance of 75km southeast to the Wind Farm Site, however this weather station only has data for the 30-year average period from 1978-2007, which has been deemed an inappropriate timescale to determine weather in the existing environment. Table 5-3 below details the regional sunshine hours at Malin Head between 1991-2020. The actual sunshine hours at the Site and therefore the percentage of time shadow flicker could actually occur is 29.79% of daylight hours. Where the annual shadow flicker is calculated for each property, it is corrected for the regional average of 29.79% sunshine, to give an accurate annual average shadow flicker prediction. Table 5-13 below outlines whether a shadow flicker mitigation strategy is required for any property within the Shadow Flicker Study Area which may be impacted by shadow flicker.

Table 5-3 Regional Sunshine (Source: Met Éireann)

Malin Head (1991-2020) Sunshine (hours)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean Daily Duration	1.3	2.4	3.4	5.3	6.5	5.5	4.7	4.7	3.8	2.6	1.6	1.1	**3.6**
Greatest Daily Duration	7.6	9.1	11.6	14.2	16	16.8	16.4	14.6	12.2	10.4	8	6.7	**16.8**
Mean num. of days with no sun	9.9	5	4.9	2.9	2.3	2	2	3	3.1	5.6	8	10.4	**59.1**
True Average Sunshine Hours hh:mm:ss		3.575	03:34:30										
Sun Factor		3:34:30	12:00:00		29.79%								

5.3 Receiving Environment

5.3.1 Population

The socio-economic study of the receiving environment included an examination of the population and employment characteristics of the area. The relevant methodology pertaining to the population and human health assessment relates to the assessment of desk-based data sourced from the following locations. Information regarding population and general socio-economic data were sourced from the Central Statistics Office (CSO), the Donegal County Development Plan 2024-2030, Fáilte Ireland and any other literature pertinent to the area. The study included an examination of the population and employment characteristics of the area. This information was sourced from the Census of Ireland 2022, which is the most recent census for which a complete dataset is available, also the Census of Ireland 2016, the Census of Agriculture 2020 and from the CSO website (www.cso.ie). Census information is divided into State, Provincial, County, Major Town, Electoral Division (ED) level.

The Site comprises of three distinct elements, the Wind Farm Site, the Grid Connection Site and the BMEP Site. It should be noted that the rEIAR considers the Wind Farm Site and the Grid Connection

Site only. Unless otherwise specified, distances are measured from the closet point of the Site throughout this Chapter.

The Wind Farm Site is located in County Donegal approximately 8km southwest of the twin towns of Ballybofey and Stranorlar and approximately 12km northeast of Donegal Town in the townlands of Meenbog and Croaghonagh. It adjoins County Tyrone, specifically the administrative division of Omagh West, Barony of Termonamongan and the townlands of Slievdoo, Meenakeeran, and Sixth Corgary or Second Croagh along the southeast of the Wind Farm Site boundary and is located approximately 19km west of Castlederg. Please refer to Figure 1-1 of Chapter 1 for the Site Location Context. The Wind Farm Site measures approximately 892 hectares. The N15 National Road runs in a south-west to north-east direction, to the northwest of the Wind Farm Site, with the proposed turbines lying about 2km east of the N15 National Road. The Wind Farm Site access is via an existing access from the N15 National Road in the northwest of the Wind Farm Site and the local road north of the Wind Farm Site. The Wind Farm Site is also served by a number of existing roads and tracks.

The Grid Connection Site extends from the Wind Farm Site entrance along the N15 National Road to the L-2595 Local Road, then proceeds to the L-1985 Local Road where it travels east along the road and through agricultural lands parallel to the Local Road before continuing along the L-19852 Local Road and finally following a private road to reach the Clogher 110kV substation. The Clogher substation is situated approximately 6.5km to the southwest of the on-site 110kV substation.

The BMEP Site is comprised of two parcels of land both contained entirely within the townland of Tievecloghoge, referred to as Parcel 1 (to the east) and Parcel 2 (to the west), which have a combined area of approximately 117ha, ~108ha of which are intended for enhancement. Land use on site within Parcel 1 and Parcel 2 currently comprises coniferous forestry and associated forestry access tracks, which is proposed to be felled and converted to peatland and scrub habitats. Site access to Parcel 1 is via a new access track located along the L-65242 Local Road, whilst site access to Parcel 2 is via an existing access track (to be extended and upgraded) located along the L-2974 Local Road. Parcel 2 is located approximately 2.3km east of the Wind Farm Site, and Parcel 1 is located approximately 4.2km east of the Wind Farm Site.

The Site falls within the townlands listed in Table 1-1 of Chapter 1. All townlands are located in Co. Donegal.

In order to assess the population in the vicinity of the Site, the 'Population Study Area' for the population section of this EIAR was defined in terms of EDs. The Site lies within 5 no. EDs: Knock, Goland, Clogher, Tawnawully and Dooish, as shown in Figure 5-4. These EDs will collectively be referred to hereafter as the Population Study Area for this chapter. The Population Study Area has a population of 4,729 persons as of 2022, with the populations of each electoral division as follows:

- Knock (1,922 persons)
- Goland (359 persons)
- Clogher (928 persons)
- Tawnawully (350 persons)
- Dooish (1,170 persons)

The total land area of the Population Study Area totals 157.6km^2 and comprises Knock 24.6 km^2 , Goland 42.3km^2, Clogher 35.4km^2, Tawnawully 34.1km^2 and Dooish 21.2km^2.

There are 4 no. properties located within 1km of the proposed turbine locations, with 3 no. of those properties belonging to landowners who are participating in the Subject Development and 1 no. property which is derelict. The closest inhabitable property, belonging to an involved landowner, is located over 750m from the nearest proposed turbine (T17), i.e. over the minimum recommended setback (500m), in accordance with the Guidelines (DoEHLG, 2006).

In order to assess the population in the vicinity of the Grid Connection, a review of properties and planning applications within 250m of the underground electrical cabling route was carried out. While the Institute of Air Quality Management (IAQM) 2024'*Guidance on the assessment of dust from demolition and construction*[9] identifies that dust emissions may be deposited up to 250m from proposed works, there are no further construction works necessary at the Grid Connection Site, and any potential effects on human health during the Operational Phase are assessed; please see Section 10.3.2.3 of Chapter 10 Air Quality for the detailed dust assessment. There are 41 no. properties located within 250m of the Grid Connection underground cable route.

In order to assess the population in the vicinity of the BMEP Site, a review of properties and planning applications within 250m was carried out. The IAQM 2024 Guidance identifies that dust emissions may be deposited up to 250m from proposed works. Therefore, under a precautionary approach, a 250m buffer has been applied to the BMEP Site to assess any potential effects on human health during the Construction Phase; please see Section 10.3.2.3 of Chapter 10 Air Quality for the detailed dust assessment. There is 1 no. property located within 250m of the BMEP Site.

For the purposes of the population baseline assessment, the Prospective Development will be examined primarily from a population perspective due to the reasons outlined above. Where the Wind Farm Site, Grid Connection Site and the BMEP Site are required to be considered separately, this is identified within the baseline assessment.

[9] https://iaqm.co.uk/wp-content/uploads/2013/02/Construction-Dust-Guidance-Jan-2024.pdf

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894000 891000 888000 885000 882000 879000

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DOOISH

KNOCK

GOLAND

TAWNAWULLY

CLOGHER

0 6 12 km

Map Legend

- Planning Application Boundary
- Population Study Area
- Meenbog Electoral Divisions (ED): Knock, Goland, Clogher, Tawnawully, Dooish

Spatial Reference
Name: IRENET95 Irish Transverse Mercator
Datum: IRENET95
Projection: Transverse Mercator

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SITE LOCATION - NOT TO SCALE

Drawing Title
Population Study Area

Project Title
Meenbog Wind Farm, Co. Donegal

Project No.	Drawing No.	Scale
240505g	5-4	1:120,000
Drawn By	Checked By	Date
SOR	RK	30/06/2026

MKO
Email: info@mkoireland.ie/ Website: www.mkoireland.ie

5.3.1.1 Population Trends

The recently published Census of 2022 shows that the population of County Donegal grew by 5.0% to 167,084 since the 2016 Census. Over the same period, Ireland's population grew by 8.1% from 4,761,865 to 5,149,139. Population statistics for the State, County Donegal and the Population Study Area have been obtained from the Central Statistics Office (CSO) and are presented in Table 5-4 below.

Table 5-4 Population 2016 – 2022 (Source: CSO)

Area	Population Change		Percentage Population Change
	2016	2022	2016– 2022
State	4,761,865	5,149,139	+8.1%
County Donegal	159,192	167,084	+5.0%
Population Study Area	4,423	4,729	+6.9

The data presented in Table 5-4 shows that the population of the Population Study Area increased by 6.9% between 2016 and 2022. This rate of population growth is the higher than that recorded at County level and, but lower than that at a State level. When the population data is examined in closer detail, it shows that the rate of population increase within the Population Study Area has been unevenly spread through the Electoral Divisions (EDs). Population increase between 2016 and 2022 has occurred within the Clogher, Dooish, Tawnawully and Knock EDs, which experienced a 9.4%, 9.2% ,8.4% and 6.2% population increase, respectively. In comparison, the populations of Goland ED, which decreased by 3.5% during the same time period. Of the EDs that make up the Population Study Area for this assessment, the highest population was recorded in Knock ED, with 1,922 persons recorded during the 2022 Census. The lowest population was recorded in Tawnanwully ED, with 350 persons recorded during the 2022 Census.

5.3.1.2 Population Density

The population densities recorded within the State, County Donegal and the Population Study Area during the 2016 and 2022 Censuses are shown in Table 5-5.

Table 5-5 Population Density in 2016-2022 (Source: CSO)

Area	Population Density (Persons per square kilometre)	
	2016	2022
State	67.8	73.3
County Donegal	33.4	35.1
Population Study Area	28.9	30

The population density of the Population Study Area recorded during the 2022 Census is 30.01 persons per km^2 which is considerably lower than the national population densities of 73.3 persons per km^2 and lower than the population density of County Donegal, recorded at 35.1 persons per km^2. Knock ED has the highest population density, at 78.1 persons per km^2, followed by Dooish at 55.2 persons per km^2.Clogher has the median population density, at 35.1 persons per km^2 while both Tawnawully and Golan EDs recorded the lowest population densities with a total of 10.3 and 8.5 persons per km^2 respectively.

5.3.1.3 Household Statistics

The number of households and average household size recorded within the State, County Donegal and the Population Study Area during the 2016 and 2022 Censuses are shown in Table 5-6.

Table 5-6 Number of Household and Average Household Size 2016 – 2022 (Source: CSO)

Area	2016		2022	
	No. of Households	Avg. Size (persons)	No. of Households	Avg. Size (persons)
State	1,702,289	2.8	1,841,152	2.7
County Donegal	58,505	2.7	61,780	2.7
Population Study Area	1,544	2.9	1,650	2.9

The figures in Table 5-6 show that while the number of households within the State, County and the EDs increased, the average number of people per household remained largely the same due to the proportionate increase in population during this period. Average household size recorded within the Population Study Area during the 2016 and 2022 Censuses is slightly above those observed at State and County level during the same period. The average household size recorded in the Population Study Area is consistent between EDs. Clogher ED recorded the highest with 3.0 persons per household in 2022. Goland and Knock EDs follow with 2.9 persons per household recorded in 2022 respectively. Both Tawnawully and Dooish EDs recorded 2.8 persons per household recorded in 2022.

5.3.1.4 Age Structure

Table 5-7 presents the population percentages of the State, County Donegal and Population Study Area within different age groups as defined by the Central Statistics Office during the 2022 Census. This data is also displayed in Figure 5-5.

Table 5-7 Population per Age Category in 2022 (Source: CSO)

Area	Age Category				
	0 - 14	15 – 24	25 - 44	45 - 64	65 +
State	19.7%	12.5%	27.6%	25.1%	15.1%
County Donegal	20.4%	11.8%	23.7%	26.3%	17.7%
Population Study Area	22.7%	12.9%	23.3%	28%	13.1%

The proportion of the Population Study Area population is broadly similar to those recorded at national and county level for most categories. For the Population Study Area, the highest population percentage occurs within the 45-64 age category (Figure 5-5). This age category would be considered to be less sensitive to change when compared to other age categories. The lowest population percentage within the Population Study Area occurs within the 15-24 range age category, at 12.9%. This is slightly higher than the County population percentage, with this age category being considered one of the more sensitive age categories to change. The age category results of the Population Study Area correspond with the trend of younger generations leaving rural areas to move to urban areas with greater education and employment opportunities.

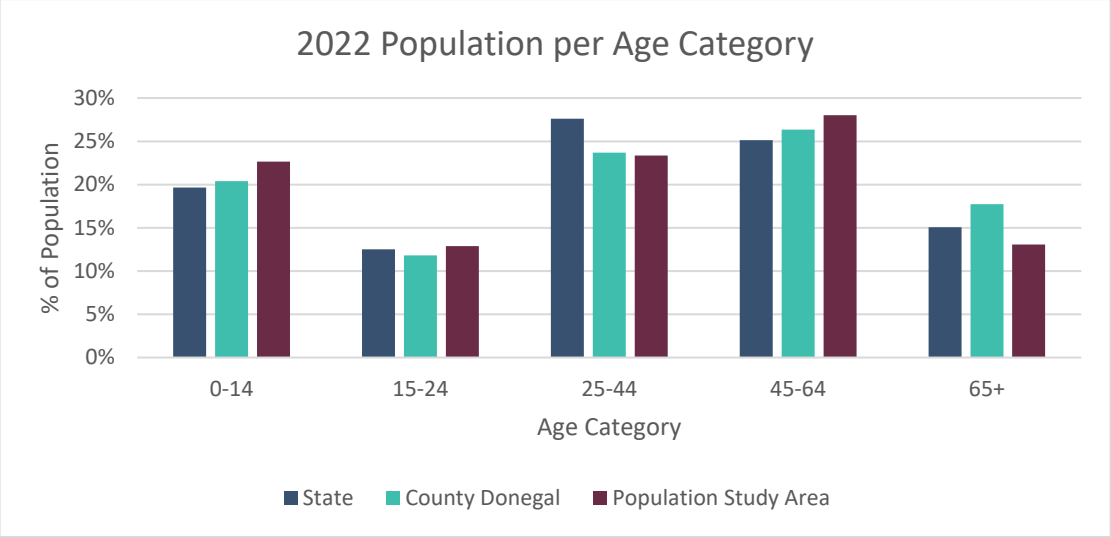

Figure 5-5 Population per Age Category in 2022 (Source: CSO)

5.3.1.5 Employment and Economic Activity

5.3.1.5.1 *Economic Status of the Population Study Area*

The labour force consists of those who can work, i.e., those who are aged 15+, out of full-time education and not performing duties that prevent them from working. There were 132,992 people (aged 15 and over) at work in Co. Donegal, an increase of 8,842 people (+7.1%) between 2016 and 2022. Nationally, there were 372,691 additional people (+16%) at work. This figure is further broken down into the percentages that were at work, seeking first time employment or unemployed. It also shows the percentage of the total population aged 15+ who were *not* in the labour force, i.e., those who were students, retired, unable to work or performing home duties. Table 5-8 shows the percentage of the total population aged 15+ who were in the labour force during the 2022 Census.

Table 5-8 Economic Status of the Total Population Aged 15+ in 2022 (Source: CSO)

Status		State	County Donegal	Population Study Area
% of population aged 15+ who are in the labour force		**61.2%**	**57.2%**	**61.2%**
% of which are:	At work	91.7%	89%	98.8%
	Looking	1.4%	1.6%	1%
	Unemployed	7%	9.1%	6.3%
% of population aged 15+ who are not in the labour force		**38.8%**	**42.8%**	**38.8%**
% of which are:	Student	28.6%	24%	30.8%
	Home duties	17%	16.6%	15.4%
	Retired	41%	45.7%	41.4%
	Unable to work	11.8%	12.6%	11.7%

Status		State	County Donegal	Population Study Area
	Other	1.7%	1.2%	0.6%

Overall, the principal economic status of those living in the Population Study Area is broadly similar to that recorded at State and County level. During the 2022 Census, the percentage of people over the age of 15 who were in the labour force in the Population Study Area was the same as that in the state and but higher to that at a county level, at 61.2% of the population. Of those who were not in the labour force during the 2022 Census, the highest percentage of the population in the Population Study Area was in the 'Retired' category, which is similar to the figures recorded at State and County level that show 'retired' as the highest category.

5.3.1.5.2 Employment by Socio-Economic Group

Socio-economic grouping divides the population into categories depending on the level of skill or educational attainment required. The 'Higher Professional' category includes scientists, engineers, solicitors, town planners and psychologists. The 'Lower Professional' category includes teachers, lab technicians, nurses, journalists, actors and driving instructors. Skilled occupations are divided into manual skilled such as bricklayers and building contractors; semi-skilled such as roofers and gardeners; and unskilled, which includes construction labourers, refuse collectors and window cleaners. Figure 5-6 shows the percentages of those employed in each socio-economic group in the State, County Donegal, and the Population Study Area during 2022.

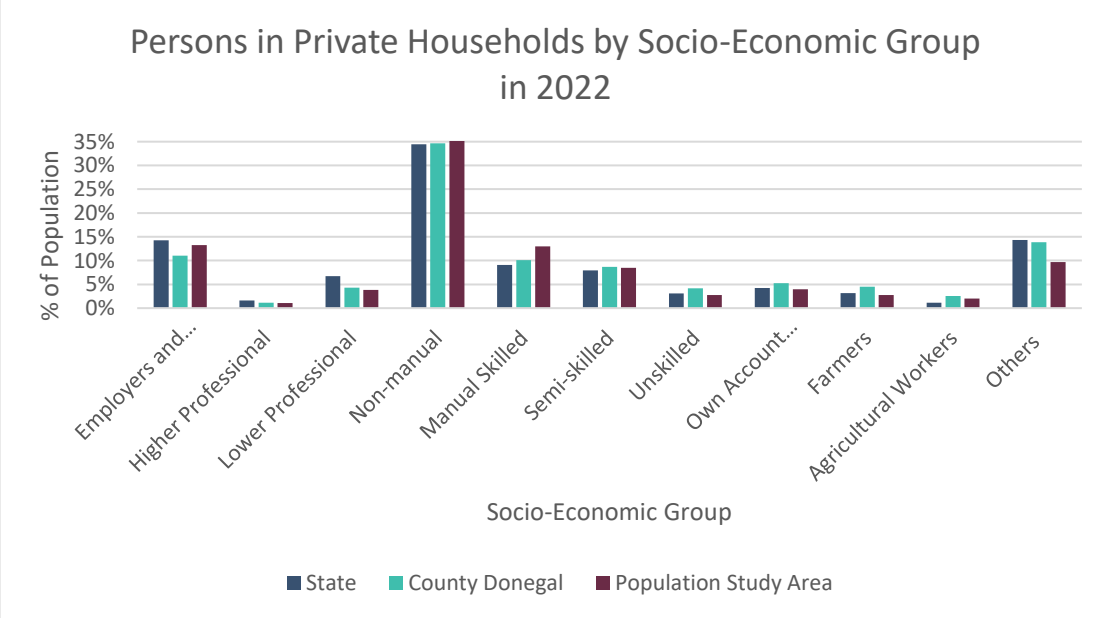

Figure 5-6 Persons in private households by socio-economic group in 2022 (Source: CSO).

The highest level of employment within the Population Study Area was recorded in the Non-Manual category. The levels of employment within the Non-Manual and Skilled Manual category were higher than those recorded for County Donegal and the State, while those recorded within the Lower Professional, Unskilled, Farmers, Agricultural Workers and Other categories were lower than those recorded for County Donegal and State levels.

The CSO employment figures grouped by socio-economic status includes the entire population for the Population Study Area, County and State in their respective categories. As such, the socio-economic category of 'Other' is skewed to include those who are not in the labour force.

5.3.1.5.3 Employment and Investment Potential in the Irish Wind Energy Industry

Background

A report entitled '*Jobs and Investment in Irish Wind Energy – Powering Ireland's Economy*'[10] was published in 2009 by Deloitte, in conjunction with the Irish Wind Energy Association (IWEA). This report focused on the ability of the Irish wind energy industry to create investment and jobs. In terms of the overall economic benefit to be obtained from wind energy, the report states in its introduction:

> *"Ireland is fortunate to enjoy one of the best wind resources in the world. Developing this resource will reduce and stabilise energy prices in Ireland and boost our long-term competitiveness as an economy. It will also significantly reduce our dependence on imported fossil fuels."*

More recently, a report published in 2014 by Siemens entitled '*An Enterprising Wind - An economic analysis of the job creation potential of the wind sector in Ireland*'[11], also in conjunction with the Irish Wind Energy Association (IWEA), concluded that, *'a major programme of investment in wind could have a sizeable positive effect on the labour market, resulting in substantial growth in employment.'* The report considers the three potential types of direct employment created, as a result of increased investment in wind energy, to be:

- Wind Energy Industry Employment:
  - Installation
  - Development
  - Planning
  - Operation and Maintenance
  - Investor activity
- Electricity Grid Network Employment
- Potential Wind Turbine Manufacturing Employment

The Sustainable Energy Authority of Ireland[12] demonstrates in their '*Wind Energy Roadmap 2011-2050*', that '*the wind energy resource represents a significant value to Ireland by 2050. This value is presented in terms of its ability to contribute to our indigenous energy needs, the benefits of enhanced employment creation and investment potential, and the ability to significantly abate carbon emissions to 2050.'*

Energy Targets

The Climate Action Plan 2025 (CAP25) was launched in April 2025. Following on from Climate Action Plans 2019, 2021, 2023, and 2024, CAP25 sets out the roadmap to deliver on Ireland's climate ambition. It aligns with the legally binding economy-wide carbon budgets and sectoral ceilings that were agreed by Government in July 2022 following 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.* CAP25 sets out indicative ranges of emissions reductions for each sector of the economy. It should be noted that the release of the Climate Action Plan 2026 (CAP26) has been delayed, and at the time of writing has not yet been published.

Further information on energy and climate change targets is detailed in Section 1.5 of Chapter 1, Sections 2.2 to 2.5 of Chapter 2 and Chapter 11 Climate of this EIAR.

[10] *Deloitte, Irish Wind Energy Association 2009 Jobs and Investment in Irish Wind Energy Powering Ireland's Economy. Available at: https://windenergyireland.com/images/files/9660bd5e72bcac538f47d1b02cc6658c97d41f.pdf*
[11] *Siemens (2014) An Enterprising Wind - An economic analysis of the job creation potential of the wind sector in Ireland. Available at: https://www.esri.ie/publications/an-enterprising-wind-an-economic-analysis-of-the-job-creation-potential-of-the-wind*
[12] *SEAI (2019), https://www.seai.ie/publications/Wind_Energy_Roadmap_2011-2050.pdf*

Employment Potential

The 2014 report *"An Enterprising Wind: An economic analysis of the job creation potential of the wind sector in Ireland"* [13]published by the Irish Wind Energy Association (IWEA) predicted that the wind energy sector in Ireland would result in 6,659 direct jobs in a scenario where 4GW capacity is achieved by 2020. This figure of 6,659 is broken down further; 5,596 of these jobs are associated directly with the construction and installation of windfarms, while the remaining 1,063 jobs are associated with the national grid. Under this scenario this contributes 1.66 direct jobs per Megawatt (MW) of wind capacity throughout the various stages of installation. According to Wind Energy Ireland, the installed wind capacity in Ireland is over 4.3GW as of February 2021, which would support employment during the last decade. Ireland needs to achieve a total of 9GW of onshore wind by 2030 which will further support further employment.

The Sustainable Energy Authority of Ireland estimates, in their '*Wind Energy Roadmap 2011-2050'*, note that '*Onshore and offshore wind could create 20,000 direct installation and O&M jobs by 2040'.* This Roadmap estimated that onshore and offshore wind could create 20,000 direct installation and operation/maintenance jobs by 2040 and that the wind industry would also have an annual investment potential of approximately €6-12 billion by 2040.

The 2014 report '*The Value of Wind Energy to Ireland'*[14], published by Pőyry, stated that growth of the wind sector in Ireland could support 23,850 jobs (construction and operational phases) by 2030. The report states that if Ireland instead chooses to not develop any more wind, then by 2030 the country will be reliant on natural gas for most of our electricity generation, at a cost of €671 million per annum in fuel import costs.

Internationally, a report issued by WindEurope in September 2017, entitled '*Wind energy in Europe: Scenarios for 2030'* [15] details various scenarios in Europe in respect to the EU target for renewable energy. According to WindEurope's High Scenario, which assumes favourable market and policy conditions including the achievement of a 35% EU renewable energy target (slightly higher than the 32% EU target for renewables), '*397 GW of wind energy capacity would be installed in the EU by 2030, 298.5 GW onshore and 99 GW offshore. In this scenario, the wind energy industry would invest €351bn by 2030, and it would create 716,000 jobs'.*

A new report published by MaREI, the SFI Research Centre for Energy, Climate and Marine, hosted by University College Cork[16] (March 2021) details that in order to meet the government target of net-zero carbon emissions by 2050, at least 25,000 jobs will be created in the development of onshore and offshore wind to meet our zero carbon targets.

A more recent report which was issued by WindEurope in February 2022, titled '*Wind Energy in Europe: 2021 Statistics and the Outlook for 2022-2026'*[17] details various scenarios in Europe in respect to the EU target for renewable energy. According to WindEurope's report, '*Europe installed 17GW (11 GW in the EU-27) of new wind capacity in 2021. This is not even half of what the EU should be building to be on track to deliver its 2030 Climate Energy Goals*.' The report continued on to state that '*We expect Europe to install 116 GW of new wind farms over the period from 2022-2026. Three quarters of these new capacity additions will be onshore wind.*' The report also states that '*The European Commission modelling shows that we need at least 79 GW offshore wind but National Government have pledged to build at least 92 GW offshore wind capacity by 2030.'*

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[13] *IWEA (2014) An Enterprising Wind: An economic analysis of the job creation potential of the wind sector in Ireland. Available at: https://www.esri.ie/publications/an-enterprising-wind-an-economic-analysis-of-the-job-creation-potential-of-the-wind*
[14] *Poyry The Value of Wind Energy to Ireland – March 2014*
[15] *WindEurope (2017) Wind Energy in Europe Scenarios for 2030 <https://windeurope.org/wp-content/uploads/files/about-wind/reports/Wind-energy-in-Europe-Scenarios-for-2030.pdf>*
[16] *https://www.marei.ie/our-climate-neutral-future-zeroby50/*
[17] *WindEurope (2022) Wind Energy in Europe 2021 Statistics and the Outlook for 2022-2026 <https://windeurope.org/intelligence-platform/product/wind-energy-in-europe-2021-statistics-and-the-outlook-for-2022-2026/>*

As of January 2026, there were 6.48GW of wind energy capacity installed on the island of Ireland[18]. Of this, 5GW was installed in the Republic of Ireland. The majority of the Republic of Ireland's installed wind energy capacity is located in Counties Donegal, Galway, Cork, Clare, Mayo and Kerry, contributing to employment potential on the Island of Ireland.

Economic Value

A 2019 report by Baringa, '*Wind for a Euro: Cost-benefit analysis of wind energy in Ireland 2000-2020*'[19], has analysed the financial impact for end consumers of the deployment of wind generation in Ireland over the period 2000-2020. The report calculates how the costs and benefits for consumers would have differed if no wind farms had been built. The analysis indicated that the deployment of 4.1GW of wind generation capacity in Ireland between 2000 and 2020 (2018-2020 results being projective) will result in a total net cost to consumers, over 20 years, of €0.1 billion (€63 million to be exact), which equates to a cost of less than €1 per person per year since 2000. Further cost benefit analysis noted that wind energy has delivered €2.3 billion in savings in the wholesale electricity market. As such, the economic benefit of renewable energy to consumers is greater than what would have been if Ireland did not invest in wind power. This corresponds with the Deloitte report which indicates that more wind energy feeding into the national grid will result in lower and more stable energy costs for consumers.

Furthermore, in May 2020, IWEA released its 70by30 Implementation Plan Reports [20] which further details the savings that can be made from the continuation of onshore wind. The report, entitled '*Saving Money - 70 by 30 Implementation Plan'*, notes that '*Baringa calculated previously that if onshore wind in Ireland can be delivered at €60/MWh, on average, between 2020 and 2030, then the 70 per cent renewable electricity target set out in the Climate Action Plan will actually be cost neutral for the consumer. If we can achieve prices under €60/MWh then Ireland's electricity consumers will be saving money'.*

The Prospective Development will, if consent is granted, contribute to the economic value that renewable energy brings to the country.

5.3.1.6 Land-Use Patterns and Activities

The land uses within the Wind Farm Site are predominantly comprised of the partially constructed Meenbog Wind Farm, commercial forestry and blanket bog. The primary surrounding land use within the Population Study Area comprises a mix of commercial forestry, pastoral agriculture, peatlands and low-density residential use along public roadways. The total area of farmland within the 4 no. EDs, around the Prospective Development, measures approximately 4,054 hectares (ha), comprising 30% of the Population Study Area, according to the CSO Census of Agriculture 2020. There are 174 farms located within the 4 no. EDs, with an average farm size of 22.9 ha. Table 5-9 shows the breakdown of farmed lands within the four EDs.

[18] Eirgrid, https://www.eirgrid.ie/grid/system-and-renewable-data-reports
[19] Baringa (2019) Wind for a Euro: Cost Benefit Analysis of Wind Energy in Ireland 2000-2020 <https://www.baringa.com/en/insights/low-carbon-futures/our-market-and-policy-studies-in-ireland/wind-for-a-euro/>
[20] https://windenergyireland.com/all-documents?file_category=21

Table 5-9 Farm Size and Classification within the Population Study Area in 2020 (Source: CSO).

DED	No of holdings	Average size (hectares)	Median age of holder	Livestock units	Average farmed (hectares)
Clogher	50	22	52.5	716	1099.9
Dooish	58	23.8	57.5	733	1381.1
Goland	37	31.1	60	535	1150.1
Knock	57	21	56	819	1196.5
Tawnawully	29	14.6	66	371	422.7
Total	**231**	**22.5(average)**	**58.4 (average)**	**3,174**	**1,050.06 (average)**
Size of 5 no. EDs			15,762hectares		
Total Area Farmed within 4 EDs			5,250.3 hectares		
Farmland as % of EDs			**33.31%**		

5.3.1.7 Services

The area within the vicinity of the Site is generally sparsely populated, with the main services located within the more densely populated towns of Ballybofey and Stranorlar, approximately 6km north of the Site, and Donegal Town approximately 8km southwest of the Site located along the N15 National Road which runs adjacent to the Wind Farm Site. All settlement centres provide retail, recreational, educational, and religious services.

5.3.1.7.1 *Education*

The nearest primary school is St. Francis National School and is approximately 2.4 km southwest of the Site at its closest point. Beyond that are Scoil Seiseaigh Ui Neill approximately 4.6 km northeast of the Site, St. Marys National School approximately 6.4km north of the Site and Dooish National School approximately 7.5km northwest and close to the twin towns of Ballybofey and Stranolar. The nearest secondary schools are located in the twin towns of Ballybofey and Stranolar which is approximately 6 km northeast of the Site, namely St. Columba's College and Finn Valley College. There are also 2 no. secondary schools in Donegal town, Donegal Aodh Rua and Nuala and Abbey Vocational School, approximately 7.6km and 8.7km southwest of the Site. Multiple third level location centres are located in the vicinity of the Site. The Atlantic Technological University (Donegal Letterkenny Campus) approximately 25.4km north of the Site and the Atlantic Technological University (Donegal Killybegs Campus) approximately 30km southwest of the Site. Furthermore, Donegal Medical Academy is located approximately 24km south of the Site and the South West College (Omagh Campus) is located approximately 38 km east of the Site in Northern Ireland.

5.3.1.7.2 *Access and Public Transport*

The Wind Farm Site is accessible via the N15 National Primary Road to the west and a local road to the north. The Wind Farm Site is also served by a number of existing roads and tracks. The Grid Connection Site extends from the Wind Farm Site south along the N15 National Primary Road, connects to the L-2595 Local Primary Road, continues to the L-1985 Local Primary Road, and proceeds along the L-19825 Local Tertiary Road to reach the Clogher substation. There are three local bus

services provided by Local Link Donegal Sligo Leitrim, through private bus operators. Bus routes 264 Ballyshannon to Letterkenny and 988 Cloghan to Letterkenny pass the Site entrance off the N15 National Primary Road Monday to Friday and the Bus Eireann route 480 from Sligo to Derry passes the Site entrance off the N15 National Primary Road daily. However, there is no bus stop in the vicinity of the. The nearest public transport access (bus stop) is in Ballybofey/Stranorlar, located approximately 11.7km northeast of the primary Wind Farm Site access point. The nearest train station to the Site is the Derry train station located approximately 45 km northeast of the Site in Northern Ireland providing connection to Belfast, and Sligo train station is located approximately 56 km south of the Site providing connection with Dublin Heuston.

5.3.1.7.3 *Amenities and Community Facilities*

There are no amenity or community facilities located within or adjacent to the Site, however there are several in the surrounding area. Located approximately 2.9km southwest of the Site is the Townawully Community Centre while Leghawney Hall is located 2.9km south of the Site). CLG Seán Mac Cumhaills is located approximately 9.6km northeast of the Site, Glenfin GAA is located 9.8km north, while Four Masters GAA Club and St Nauls GAA and LGFA are located approximately 8.9km and 14.1 southwest of the Site. Amenities and community facilities, including other sports clubs, youth clubs, and recreational areas are located in Ballybofey/Stranorlar and Donegal Town. There are limited amenities in the surrounding area of the Site. The Gap Lodge B&B and Biddy O'Barnes gastropub and car park is located within 100m of the Grid ConnectionSite. Community Gain proposals, which would provide the opportunity to enhance local amenities and community facilities are described in Section 4.10 of Chapter 4: Description of the Prospective Development.

5.3.2 Tourism

For the purposes of this section, the Wind Farm Site and BMEP Site are considered in relation to the tourism baseline assessment set out below. The Grid Connection is located solely underground, and no construction works are necessary and thus has no potential for impacts on tourism. As such, the Grid Connection Site has not been considered further in this assessment.

5.3.2.1 Tourism and Revenue

Tourism is one of the major contributors to the national economy and is a significant source of full time and seasonal employment. *Key Tourism Facts 2024*[21], pertaining to domestic and international tourism volumes for Ireland, was published by Failte Ireland in August 2025 for the year 2024. In 2024, out-of-state (Overseas and Northern Ireland) tourist expenditure amounted to €6.6 billion. With a further €1.5 billion spent by overseas visitors on fares to Irish carriers, taking foreign exchange earnings to €8 billion. Domestic tourism expenditure amounted to €3.6 billion, making tourism a €12 billion industry. The Central Statistics Office's estimates the number of people employed in 'Tourism Industries' to be 226,300 in Q3 2024 through an alternative method of estimating employment using PAYE tax data. Note that self-employed and primarily pensioners are excluded from the headcount.

Key Tourism Facts 2024, published in 2025 does not provide the same level of detail in terms of tourist numbers and expenditure as previous years of the same report as a result of a change in the CSO's data collection methodology, however, it does note that

> *"Every €1m of tourist expenditure helps to support 20 employees in tourism industries."*

[21] *Fáilte Ireland (2025) Key Tourism Facts 2024 National Summary. Available at: https://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/Research/Key%20Tourism%20Facts%20and%20Figures%202024/FI_Key-Tourism-Facts-2024_National-Summary_1.pdf?ext=.pdf*

The Republic of Ireland is divided into seven tourism regions. Table 5-10 shows the total revenue and breakdown of overseas tourist numbers to each region in Ireland during 2024 ('*Key Tourism Facts 2024*, Fáilte Ireland, August 2025).

Table 5-10 Overseas Tourists Revenue and Numbers 2024 (Source: Fáilte Ireland)

Region	Total Revenue (€m)	Total Number of Non-Domestic Tourists (000s)
Dublin	€2,383m	4,094
Mid-East/Midlands	€536m	804
South-East	€323m	530
South-West	€1,168m	1,442
Mid-West	€536m	827
West	€847m	1,226
Border	**€376m**	**504**
Total	**€6,169 m**	**9,427**

The Border Region, in which the Site is located, comprises Counties Cavan, Donegal, Leitrim, Monaghan and Sligo. This Region benefited from approximately 5.3% of the total number of overseas tourists to the country and approximately 6.1% of the total tourism income generated in Ireland in 2024. The latest release by the CSO on tourism in Ireland '*Inbound Tourism December 2025*'[22] released by the CSO in January 2025 provides a the most up to date annual snapshot of tourism in Ireland. As of December 2025, the number of overseas tourists between January and December 2025 was just over 6.4 million, which was a 3% decrease from 2024, with almost 6.6 million for the same period. The latest release by the CSO '*Inbound Tourism January 2026*'[23] (CSO, February 2026), provides a monthly overview of tourism in Ireland for January 2026.

Table 5-11 presents the breakdown of tourist numbers and revenue to County Donegal during 2024 ('*Donegal Key Tourism Facts 2024',* Fáilte Ireland, August 2025)[24]. As can be observed in Table 5-11, County Donegal had a higher number of Domestic tourists visiting the County than Overseas tourist during 2025, with each group generating tourism revenue of €180 million and €281million respectively. The key activities which domestic holiday makers engaged in included walking, hiking touring by car, visiting houses/castles and visiting nature reserves/national parks.

[22] *CSO (January 2026). Inbound Tourism December 2025. Available at: https://www.cso.ie/en/releasesandpublications/ep/p-ibt/inboundtourismdecember2025/*
[23] *CSO (February 2026). Inbound Tourism January 2026. Available at: https://www.cso.ie/en/releasesandpublications/ep/p-ibt/inboundtourismjanuary2026/*
[24] *Failte Ireland (2025) Donegal Key Tourism Facts 2024. Available at: https://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/Research/Key%20Tourism%20Facts%20and%20Figures%202024/FI_Key-Tourism-Facts-2024_Donegal.pdf?ext=.pdf*

Table 5-11 Tourism to Donegal during 2024 (Source: Fáilte Ireland)

County	Overseas Tourists	Domestic Tourists
Revenue Generated (€m)	180	281
No. of Tourists (000s)	243,000	867,000
Average spend per capita (€)	739	324
Average nights spent in County	5.8	3.4

5.3.2.2 Tourism Attractions

There are no key identified tourist attractions pertaining specifically to the Wind Farm Site and BMEP Site.

5.3.2.2.1 *Tourism Attractions within the surrounding landscape*

There are numerous tourist attractions within County Donegal including Donegal Town, Letterkenny, mountain ranges including Mount Errigal and Glenveagh National Park. Many additional tourist attractions are found in the county.

Barnesmore Gap, also known locally as 'The Gap' or 'The Big Gap', is a deep pass which runs adjacent to the Wind Farm Site along the N15 National Road. This glacially carved valley acts as a natural corridor through the Blue Stack Mountains, dividing them into two sections, with Croaghconnellagh to the northwest and Barnesmore Mountain to the southeast. The pass is a popular tourist destination.

The Northwest Cycle trail, runs along the N15 National Road which is adjacent to the Wind Farm Site. It has a total length of 325 km running from Enniskillen through Sligo, Donegal, Lifford, Strabane to Omagh.

The Discover Ireland website (www.discoverireland.ie) lists the following attractions within the vicinity of the Site:

- Ardnamona wood nature reserve is a native oak woodland, approximately 456.6 hectares in size which lies approx.,9.7km southwest of the nearest proposed turbine (T01).
- Lurgybrack Open Farm facilitates a wide range of family activities including open farm and consists of lots of different animals, a riverside walk, duck pond, playground and tearoom located c. 20km north of the BMEP Site.
- Donegal Craft Village which showcases local artists, jewellers and workshops is located 16.6km southwest of the nearest proposed turbine (T01).
- Donegal Railway Village, which comprises of railway rolling stock, an interactive railway cab, artefacts, displays, a video and audio presentations, model railways, a reference library and shop is located approximately 15 km from the nearest proposed turbine (T03).
- There are a number of coastal boat tours which leave from the Pier on the River Eske in Donegal Town, approximately 15km from the Wind Farm Site.
  Donegal Castle is a 15th century castle located within Donegal Town, just over 15km southwest of the Wind Farm Site.

The Site is not within any of the strategic tourism areas identified in the DCDP nor does it impact on any of the sites of existing tourism attractions.

The potential for visual effects arising from the Prospective Development on the wider landscape and scenic roads is robustly assessed in Chapter 13 LVIA of this EIAR.

Chapter 14 Cultural Heritage provides details of the cultural heritage of the Site. Archaeological sites and monuments are part of Irish national heritage and are recognised tourist attractions across the country. No National Monuments, those subject to a Preservation Order or NI State Care sites are located within the Wind Farm Site or within 10km of the nearest proposed turbine. The nearest monument in State Care (NM No. 174) comprises Donegal Castle which is located over 15km to the south-west of T3. the nearest monument subject to a Preservation Order is situated c.11km to the north-east of T19.

5.3.2.3 Tourist Attitudes to Wind Farms

5.3.2.3.1 *Scottish Tourism Study 2021*

BiGGAR Economics undertook an independent study in 2021, entitled '*Wind Farms & Tourism Trends in Scotland: Evidence from 44 Wind Farms*'[25] to understand the relationship, if any, that exists between the development of onshore wind and the sustainable tourism sector in Scotland. In recent years, the onshore wind sector and sustainable tourism sector have grown significantly in Scotland. However, it could be argued that if there was any relationship between the growth of onshore wind energy and tourism, it would be at a more local level. This study therefore considered the evidence at a local authority level and in the immediate vicinity of constructed wind farms.

Since 2009, the onshore wind sector has expanded considerably in Scotland. Employment in tourism-related sectors in Scotland also grew during the years since 2009, an overall increase of 20%.

Analysis of the rates of change in the number of onshore wind turbines and in tourism-related employment in local authority areas, found that there is no correlation between the two factors. This applies to whether the analysis covers the decade between 2009 – 2019, or the more recent 2015 to 2019 period.

The research also analysed trends in tourism employment within the immediate vicinity of wind farm developments. This included 16 no. wind farms with a capacity of at least 10MW that became operational between 2015 and 2019. Analysis of trends in tourism employment in the locality of these wind farms (study areas were based on a 15km radius) found that 11 of these 16 areas had experienced more growth in tourism employment than for Scotland as a whole. For 12 of the 16 wind farms, trends in tourism employment in the locality had outperformed the local authority area in which they were based.

The research also re-examined 28 wind farms constructed between 2009 and 2015 that had been analysed in a previous study published in 2017, finding that the localities in which they were based had outperformed Scotland and their local authority areas in the majority of cases. Moreover, the analysis, found that in the seven areas which had underperformed their local authority areas in the 2017 study, four had done better than their local authorities in the 2015 to 2019 period.

This research analysed trends in tourism employment in the localities of 44 no. wind farms developed in recent years, providing a substantial evidence base.

Overall, the conclusion of this study is that published national statistics on employment in sustainable tourism demonstrate that there is no relationship between the development of onshore wind farms and tourism employment at the level of the Scottish economy, at local authority level, nor in the areas immediately surrounding wind farm development. However, the report also concluded that:

[25] *BiGGAR Economics (2016) Wind Farms and Tourism Trends in Scotland* <https://biggareconomics.co.uk/wp-content/uploads/2021/11/BiGGAR-Economics-Wind-Farms-and-Tourism-2021.pdf>

"*Although this study does not suggest that there is any direct relationship between tourism sector growth and wind farm development, it does show that wind farms do not cause a decrease in tourism employment either at a local or a national level.*"

5.3.2.3.2 Fáilte Ireland Surveys 2007 and 2012

In 2007, Fáilte Ireland in association with the Northern Ireland Tourist Board carried out a survey of domestic and overseas holidaymakers to Ireland in order to determine their attitudes to wind farms. The purpose of the survey was to assess whether the development of wind farms impacts on the enjoyment of the Irish scenery by holidaymakers. The survey involved face-to-face interviews with 1,300 tourists (25% domestic and 75% overseas). The results of the survey are presented in the Fáilte Ireland Newsletter 2008/No.3 entitled '*Visitor Attitudes on the Environment: Wind Farms*'.[26]

The Fáilte Ireland survey results indicate that most visitors are broadly positive towards the idea of building wind farms in Ireland. There exists a sizeable minority (one in seven) however who are negative towards wind farms in any context. In terms of awareness of wind farms, the findings of the survey include the following:

- Almost half of those surveyed had seen at least one wind farm on their holiday to Ireland. Of these, two thirds had seen up to two wind farms during their holiday.
- Typically, wind farms are encountered in the landscape while driving or being driven (74%), while few have experienced a wind farm up close.
- Of the wind farms viewed, most contained less than ten turbines and 15% had less than five turbines.

Regarding the perceived impact of wind farms on sightseeing, the Fáilte Ireland report states:

"Despite the fact that almost half of the tourists interviewed had seen at least one wind farm on their holiday, most felt that their presence did not detract from the quality of their sightseeing, with the largest proportion (45%) saying that the presence of the wind farm had a positive impact on their enjoyment of sightseeing, with 15% claiming that they had a negative impact."

In assessing the perceived impact of wind farms on beauty, visitors were asked to rate the beauty of five different landscapes types: Coastal, Mountain, Farmland, Bogland and Urban Industrial, and then rate on a scale of 1-5 the potential impact of a wind farm being sited in each landscape. The survey found that each potential wind farm must be assessed on its own merits. Overall, however, in looking at wind farm developments in different landscape types, the numbers claiming a positive impact on the landscape due to wind farms were greater than those claiming a negative impact, in all cases.

Regarding the perceived impact of wind farms on future visits to the area, the Fáilte Ireland survey states:

"Almost three quarters of respondents claim that potentially greater numbers of wind farms would either have no impact on their likelihood to visit or have a strong or fairly strong positive impact on future visits to the island of Ireland. Of those who feel that a potentially greater number of wind farms would positively impact on their likelihood to visit, the key driver is their support for renewable energy and potential decreased carbon emissions."

The report goes on to state that while there is a generally positive disposition among tourists towards wind development in Ireland, it is important also to take account of the views of the one in seven tourists who are negatively disposed towards wind farms. This requires good planning on the part of the wind farm developer as well as the Local Authority. Good planning has been an integral component of

[26] *Fáilte Ireland (2008) Visitor Attitudes on the Environment – Wind Farms* <https://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/4_Visitor_Insights/Visitor-Attitudes-on-the-Environment.pdf?ext=.pdf>

the Prospective Development throughout the design and assessment processes. Reference has been made to the Guidelines (DoEHLG, 2006) and the Draft Guidelines (DoHPLG, 2019) in addition to Wind Energy Ireland (WEI) (previously IWEA) best practice guidance, throughout all stages, including pre-planning consultation and scoping.

The 2007 survey findings are further upheld by a more recent report carried out by Fáilte Ireland on tourism attitudes to wind farms in 2012. The results of the updated study were published in the Fáilte Ireland Newsletter 2012/No.1 entitled '*Visitor Attitudes on the Environment: Wind Farms – Update on 2007 Research*'[27]. The updated survey found that of 1,000 domestic and foreign tourists who holidayed in Ireland during 2012, over half of tourists said that they had seen a wind turbine while travelling around the country. Of this number of tourists, 21% claimed wind turbines had a negative impact on the landscape. However, 32% said that it enhanced the surrounding landscape, while 47% said that it made no difference to the landscape. Almost three quarters of respondents claim that potentially greater numbers of wind farms would either have no impact on their likelihood to visit or have a strong or fairly strong positive impact on future visits to the island of Ireland.

Further details regarding the general public perception of wind energy, including those living in the vicinity of a wind farm, are presented in Section 5.3.3 below.

5.3.3 Public Perception of Wind Energy

5.3.3.1 Sustainable Energy Authority of Ireland Surveys on Opinions Towards Wind Farms

5.3.3.1.1 *Irish National Survey of Households Near New Commercial Wind and Solar Farms*

Background

In May 2023 the Sustainable Energy Authority of Ireland (SEAI) published a report on the national survey they commissioned of people's opinions of new commercial solar or wind farm projects in Ireland.[28] In 2022, surveyors conducted in-person interviews on the doorstep across rural Ireland. The survey included 1,764 households which included 1,116 households within 5km of a new commercial wind or solar project sites, of which 219 live within 1km of a project site.

2023 Findings

The results of this survey revealed that 67% of respondents hold positive or very positive views towards wind energy, while 73% of respondents who live less than 1km away from a Renewable Electricity Support Scheme (RESS) wind project hold positive or very positive attitudes towards wind energy, while 70% of those in the control group hold such views.

The attitude of the residents toward wind energy showed that 59% of all respondents, and 65% of respondents living less than 1km away from a RESS wind project, felt Ireland has too few wind farms, the same proportion as the control group. A few respondents feel Ireland has too many wind farms, regardless of how close they live to a new wind farm.

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[27] *Fáilte Ireland (2008) Visitor Attitudes on the Environment: Wind Farms – Update on 2007. Available at* <https://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/4_Visitor_Insights/WindFarm-VAS-(FINAL)-(2).pdf?ext=.pdf>

[28] *SEAI Irish national survey of households near new commercial wind and solar farms. Available at:* <https://www.seai.ie/publications/SEAI-RESS-National-Survey.pdf>

The results of this survey will form part of a long-term study to understand the effects of government policies under the RESS on the publics support for Irelands energy transition.

5.3.3.1.2 *Sustainable Energy Authority of Ireland Survey 2003*

Background

The first wind farm in Ireland was completed in 1992 at Bellacorrick, Co. Mayo, by mid-2007 there were 67 wind farms and in 2024 there are almost 400 wind farms on the island of Ireland. Since 1992 wind farms have elicited a range of reactions from the Irish people.[29] In response, the SEAI (formerly SEI) commissioned a survey aimed at identifying public attitudes to renewable energy and to wind energy in Ireland.[30] The results of which were published in 2003 and updated in 2017 as a national survey entitled '*Attitudes Towards the Development of Wind Farms in Ireland*'. A catchment area survey was also carried out by to focus specifically on people living with a wind farm in their locality or in areas where wind farms are planned.

2003 Findings

The SEAI survey published in 2003, found that the overall attitude to wind farms is very positive, with 84% of respondents rating it positively or very positively. One percent rates it negatively and 14% had no opinion either way. Approximately two thirds of respondents (67%) were found to be positively disposed to having a wind farm in their locality. Where negative attitudes were voiced towards wind farms, the visual effect of the turbines on the landscape was the strongest influence. The report also notes however that the findings obtained within wind farm catchment areas showed that effect on the landscape is not a major concern for those living near an existing wind farm.

With regards to the economic and environmental effects of wind farm development, the national survey reveals that attitudes towards wind energy are influenced by a perception that wind is an attractive source of energy:

> *"Over 8 in 10 recognise wind as a non-polluting source of energy, while a similar number believe it can make a significant contribution to Ireland's energy requirements."*

The study reveals uncertainty among respondents with regards to the issues of noise levels, local benefits and the reliability or otherwise of wind power as an energy source. It goes on to state however that the finding that people who have seen wind farms rate these economic and environmental factors more favourably is a further indication that some experience of the structures tends to translate into positive attitudes towards wind energy.

Similar to the national survey, the surveys of those living within the vicinity of a wind farm also found that the findings are generally positive towards wind farms. Perceptions of the effect of the development on the locality were generally positive, with some three-quarters of interviewees believing it had impacted positively.

In areas where a wind farm development had been granted planning permission but was not yet under construction, three quarters of the interviewees expressed themselves in favour of the wind farm being built in their area. Four per cent were against the development. The reasons cited by those who expressed themselves in favour of the wind farm included the fact that wind energy is clean (78%), it would provide local jobs (44%), it would help develop the area (32%) and that it would add to the

[29] *Fáilte Ireland (2008) Visitor Attitudes on the Environment – Wind Farms. Available at: https://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/4_Visitor_Insights/Visitor-Attitudes-on-the-Environment.pdf?ext=.pdf*
[30] *Ibid.*

landscape (13%). Those with direct experience of a wind farm in the locality are generally impressed with it as an additional feature in the landscape. The report states:

> *"It is particularly encouraging that those with experience of wind turbines are most favourable to their development and that wind farms are not solely seen as good in theory, but are also seen as beneficial when they are actually built."*

Few of those living in proximity either to an existing wind farm or one for which permission has been granted believe that the development damages the locality, either in terms of damage to tourism potential or to wildlife. The survey found that there is a clear preference for larger turbines in smaller numbers over smaller turbines in larger numbers.

5.3.3.1.3 Survey Update 2017

Additionally, a survey carried out by Interactions in October 2017, published by the SEAI, show 47% of Irish adults polled said they were strongly in favour of wind power in Ireland while a further 38% favour it. Overall, this is a 4% increase in favourable attitudes towards wind power compared with similar research in 2013.

The SEAI survey found that the overall attitude to wind farms is very positive, with 84% of respondents in favour of the use of wind energy in Ireland. Approximately two thirds of respondents (70%) would prefer to power their home with renewable energy over fossil fuels, and 45% would be in favour of a wind farm development in their area.

The survey also captured the perceived benefits of wind power among the public. Of those surveyed three quarters selected good for the environment and reduced Carbon Dioxide emissions while fewer people, just over two in three, cited cheaper electricity.

The final section of the 2017 report states:

> *"The overwhelming indication from this study is that wind energy enjoys great support and, more specifically, that the development of wind farms is supported and welcomed. The single most powerful indicator of this is to be found among those living in proximity to an existing wind farm: over 60% would be in favour of a second wind farm or an extension of the existing one. This represents a strong vote in favour of wind farm developments – especially important since it is voiced by those who know from direct experience about the impact of such developments on their communities."*

5.3.3.1.4 Conclusions

The main findings of the SEAI Surveys from 2003, 2017, and 2023 show consistently strong public support for wind energy in Ireland. In 2003, 84% of respondents viewed wind energy positively, with 67% open to having a wind farm nearby and concerns mainly limited to visual impact. The 2017 SEAI survey reported a similar 84% favourability, with 70% preferring renewable energy for their homes and 45% supporting local wind farm development, citing environmental and cost benefits. By 2023, support remained high, with 67% overall and 73% of those living near RESS-supported projects holding positive views, suggesting that proximity and direct experience with wind farms continue to reinforce favourable attitudes. These studies highlights that two-thirds of Irish adults are generally favourable to having a wind farm built in their locality, with little evidence of a "Not In My Back Yard" (NIMBY) effect.

5.3.3.2 Public Perceptions of Wind Power in Scotland and Ireland Survey 2005

Background

A survey of the public perception of wind power in Scotland and Ireland was carried out in 2003/2004 by researchers at the School of Geography & Geosciences, University of St. Andrews, Fife and The Macaulay Institute, Aberdeen ('*Green on Green: Public Perceptions of Wind Power in Scotland and Ireland*', Journal of Environmental Planning and Management, November 2005).[31] The aims of the study were to ascertain the extent to which people support or oppose wind power, to investigate the reasons for these attitudes and to establish how public attitudes relate to factors such as personal experience of operational wind farms and their proximity to them.

Study Area

Surveys were carried out at two localities in the Scottish Borders region, one surrounding an existing wind farm and one around a site at which a wind farm had received planning permission but had not yet been built. Surveys were also carried out in Ireland, at two sites in Counties Cork and Kerry, each of which had two wind farms in proximity to each other.

Findings

The survey of public attitudes at both the Scottish and Irish study sites concluded that large majorities of people are strongly in favour of their local wind farm, their personal experience having engendered positive attitudes. Attitudes towards the concept of wind energy were described as *"overwhelmingly positive*" at both study sites in Scotland, while the Irish survey results showed almost full support for renewable energy and 92% support for the development of wind energy in Ireland.

The results of the survey were found to agree with the findings of previous research, which show that positive attitudes to wind power increase through time and with proximity to wind farms. With regards to the NIMBY effect, the report states that where NIMBY-ism does occur, it is much more pronounced in relation to proposed wind farms than actual wind farms. The Scottish survey found that while positive attitudes towards wind power were observed among those living in proximity to both the proposed and existing wind farm sites, people around the proposed site were less convinced than those living in proximity to the existing site. Retrospective questioning regarding pre- and post-construction attitudes at the existing site found that attitudes remained unchanged for 65% of respondents. Of the 24% of people who altered their attitudes following experience of the wind farm, all but one became more positive. The report states:

> *"These results support earlier work which has found that opposition to wind farms arises in part from exaggerated perceptions of likely impact, and that the experience of living near a wind farm frequently dispels these fears. Prior to construction, locals typically expect the landscape impacts to be negative, whereas, once in operation, many people regard them as an attractive addition."*

The reasons that people gave for their positive attitude to the local wind farm were predominantly of a global kind, i.e. environmental protection and the promotion of renewable energy, together with opposition to a reliance on fossil fuels and nuclear power. Problems that are often cited as negative effects of wind farms, such as interference with telecommunications and shadow flicker were not

[31] *Green on Green: Public Perceptions of Wind Power in Scotland and Ireland', Journal of Environmental Planning and Management, November 2005* <https://www.researchgate.net/publication/227619753_'Green_on_Green'_Public_Perceptions_of_Wind_Power_in_Scotland_and_Ireland>

mentioned at either site. With regards to those who changed to a more positive attitude following construction of the wind farm, the reasons given were that the wind farm is *"not unattractive (62%), that there was no noise (15%), that community funding had been forthcoming (15%) and that it could be a tourist attraction (8%)".*

The findings of the Irish survey reinforce those obtained at the Scottish sites with regards to the increase in positive attitudes to wind power through time and proximity to wind farms. The survey of public attitudes at the sites in Cork and Kerry found that the highest levels of support for wind power were recorded in the innermost study zone (0 – 5 kilometres from a point in between the pair of wind farms). The data also suggests that *"those who see the wind farms most often are most accepting of the visual impact"*. The report also states that a previous Irish survey found that most of those with direct experience of wind farms do not consider that they have had any adverse effect on the scenic beauty of the area, or on wildlife, tourism or property values. Overall, the study data reveals *"a clear pattern of public attitudes becoming significantly more positive following personal experience of operational wind farms".*

With regards to wind farm size, the report notes that it is evident from this and previous research that wind farms with small numbers of large turbines are generally preferred to those with large numbers of smaller turbines.

Conclusions

The overall conclusions drawn from the survey findings and from the authors' review of previous studies show that local people become more favourable towards wind farms after construction, that the degree of acceptance increases with proximity to them, and that the NIMBY effect does not adequately explain variations in public attitudes due to the degree of subjectivity involved.

5.3.3.3 Wind Energy Ireland National Polls on Wind Energy

5.3.3.3.1 *IWEA Interactions Opinion Poll on Wind Energy 2019*

Published in January 2020, Irish Wind Energy Association (IWEA) undertook a national opinion poll on Wind Energy November 2019 with the objective to "*measure and track public perceptions and attitudes around wind energy amongst Irish adults*." Between November 20th – 30th 2019, a nationally represented sample of 1,019 adults and a booster sample of 200 rural residents participated in an online survey. The 2019 results indicate that 79% of both the nationally represented sample and rural sample strongly favour or favour wind power while 16% of both samples neither favour or oppose it. Amongst those in favour of wind power, the majority cited environmental and climate concerns as their main reasons for supporting such developments. Other reasons cited for supporting wind energy developments include: "economic benefits," "reliable/efficient," "positive experience with wind energy" and recognise it as a "safe resource." When questioned about wind developments in their local area, 55% of nationally represented sample favour or tend to favour such proposals and 51% of the rural population reported the same. Reasons cited for supporting wind developments in their local area include: "good for the environment," "social responsibility," "create jobs," "good for the community."

The IWEA November 2019 survey follows previous national opinion polls on wind energy undertaken in October 2017 and November 2018. The 2019 survey results are consistent with the 2017 and 2018 figures and thus indicate that approximately 4 out of 5 Irish adults have continued to support for wind energy in recent years.

5.3.3.3.2 *Wind Energy Ireland(WEI) Public Attitudes Monitor 2022*

Published in December 2022, WEI undertook a national opinion poll on Wind Energy in Q4 of 2022 with the objective '*to measures & track the perceptions and attitudes around wind energy amongst Irish adults*'. Between November 23rd and December 8th 2022, a nationally represented sample of 1,017 and

a booster samples of 201 rural dwellers participated in the survey. The 2022 results indicate that 80% of the nationally representative sample and 85% of the rural sample strongly favour or favour wind power. Almost half (45%) of those surveyed ranked cheaper electricity as the top wind energy benefit. Amongst rural residents, the percentage of people producing negative feedback is reducing year on year. Nationally, 58% of people said that they would be in favour of a wind farm in their area, which is the highest number in favour since tracking began. Amongst rural residents, just 1 in 10 people registered being opposed to having a wind farm in their local area.

The WEI (formerly Irish Wind Energy Association (IWEA)) December 2022 survey follows previous national opinion polls on wind energy undertaken by IWEA in November 2019 and November 2018. The 2022 survey results are consistent with the 2019 and 2018 figures and thus indicate that 4 out of 5 Irish adults have continued to support wind energy in recent years.

5.3.3.3.3 WEI Interactions Opinion Poll on Wind Energy 2023

In early 2023, WEI published the results of their most recent nationwide annual poll on attitudes to wind energy, the Public Attitudes Monitor.[32] The objective of the poll was to '*measure and track public perceptions and attitudes around wind energy amongst Irish adults*.'

Between 23rd November and 8th December 2022, a nationally representative sample of 1,017 Irish adults together with a booster sample of 201 rural residents participated in the survey. The 2022 results reported that 4 in 5 (80%) are now in favour of wind power which is a 6% increase on the 2021 results (54% of those in favour were 'strongly in favour'). Amongst rural residents, 4 in 5 (85%) were recorded as having favourable attitudes towards wind power. The survey has been run annually since 2017 and while there has been a marginal decrease in those in favour of wind power nationally during this time (from 85% to 80%) there has been an increase in those in favour from the rural population (from 79% to 85%).

Amongst those in favour of wind power, the majority cited the fact that Ireland was a windy country with a readily available renewable resource and environmental and climate concerns as their main reasons for supporting such developments. Other reasons cited for supporting wind energy developments include: 'free/cheap/costs less', 'reliable/efficient', 'economy/jobs', and view that it as a 'safe resource'.

When questioned about wind energy developments in their local area, 58% of the nationally representative sample either 'favour' or 'tend to favour' such proposals compared to 56% of the rural population reporting the same.

The Wind Energy Ireland 2023 survey follows the structure of previous national opinion polls on wind energy undertaken since 2017. The 2023 survey results are consistent with previous year's figures and thus indicate that approximately 4 out of 5 Irish adults have continued to support wind energy in recent years.

5.3.3.3.4 WEI Public Attitudes Monitor 2024

In late 2024, WEI published the results of their most recent nationwide annual poll on attitudes to wind energy, the Public Attitudes Monitor[33]. The objective of the poll was to "*measure and track public perceptions and attitudes around wind energy across ROI*".

Between 17th November and 1st December 2024, a nationally representative sample of 1,070 Irish adults together with a booster sample of 210 rural residents participated in the survey. The 2024 results

[32] https://windenergyireland.com/about-wind/more-resources/annual-wind-survey
[33] *Wind Energy Attitudes Monitor, 2024. Wind Energy Attitudes Monitor. Available at:* https://windenergyireland.com/images/files/wind-energy-ireland-2024-report-key-slides-website.pdf

reported that 4 in 5 (80%) are now in favour of wind power (55% of those in favour were 'strongly in favour'). Amongst rural residents, 80% were recorded as having favourable attitudes towards wind power. The survey has been run annually since 2017 and while there has been a marginal decrease in those in favour of wind power nationally during this time (from 85% to 80%) there has been a minor increase in those in favour from the rural population (from 79% to 80%).

Amongst those in favour of wind power, the majority cited that the reduction in electricity prices as their primary perceived benefit of wind energy. Other reasons cited for supporting wind energy developments include: 'reduces CO_2 emissions", "good for the environment", "supports energy independence", "creates employment", and "good for local communities".

When questioned about wind energy developments in their local area, 62% of the nationally representative sample either 'favour' or 'tend to favour', an increase from 54% in 2020.

The WEI 2024 survey follows the structure of previous national opinion polls on wind energy undertaken since 2017. The 2024 survey results are consistent with previous year's figures and thus indicate that approximately 4 out of 5 Irish adults have continued to support wind energy in recent years.

5.3.3.3.5 *Conclusion*

The WEI national opinion polls from 2019 to 2024 consistently demonstrate strong and sustained public support for wind energy among Irish adults. Across all years, approximately 80% of respondents nationally, and increasingly among rural residents, expressed favourable attitudes towards wind energy. Support is driven primarily by environmental concerns, the perception of wind as a safe and reliable resource, and its potential to lower electricity costs. Notably, acceptance of local wind energy developments has also grown, with 62% of the national sample supporting such projects in 2025, the highest level recorded to date. These findings highlight a stable and positive public attitude towards wind energy in Ireland, reinforcing its role in the country's renewable energy strategy.

5.3.3.4 University College Cork Study, 2024

A 2024 study published by University College Cork researchers le Maitre et al. (2024) *titled 'Do concerns about wind farms blow over with time? Residents' acceptance over phases of project development and proximity'* similarly investigates the relationship between 'near neighbours' of Wind Farms and provides descriptive statistics on the profiling and opinions of wind farm 'near neighbours'. This Republic of Ireland based study employed a large scale experimental survey of 1109 participants within 10km of an existing wind farm in Ireland, to assess public perception to accept further onshore wind energy developments. Data was collected through an online survey conducted in May–July 2021 and July–August 2022. The survey focused on residents living near to existing wind farms at the various project stages (planning, construction and operational). The study looked to understand residents attitudes towards another (new) wind farm located near to their home. The survey screened respondents on the basis of their age, gender, and region to identify a suitable sample living with 10km of a wind farm. The survey investigates whether residents would prefer to maintain the "status quo" (i.e. no further wind farm developments in the area) or have willingness to accept further development in the area. Please see Figure 5-7 below which details how distance, as well as the phase of the wind farms the residents are 'near neighbours' to, dictates their preference for additional developments.

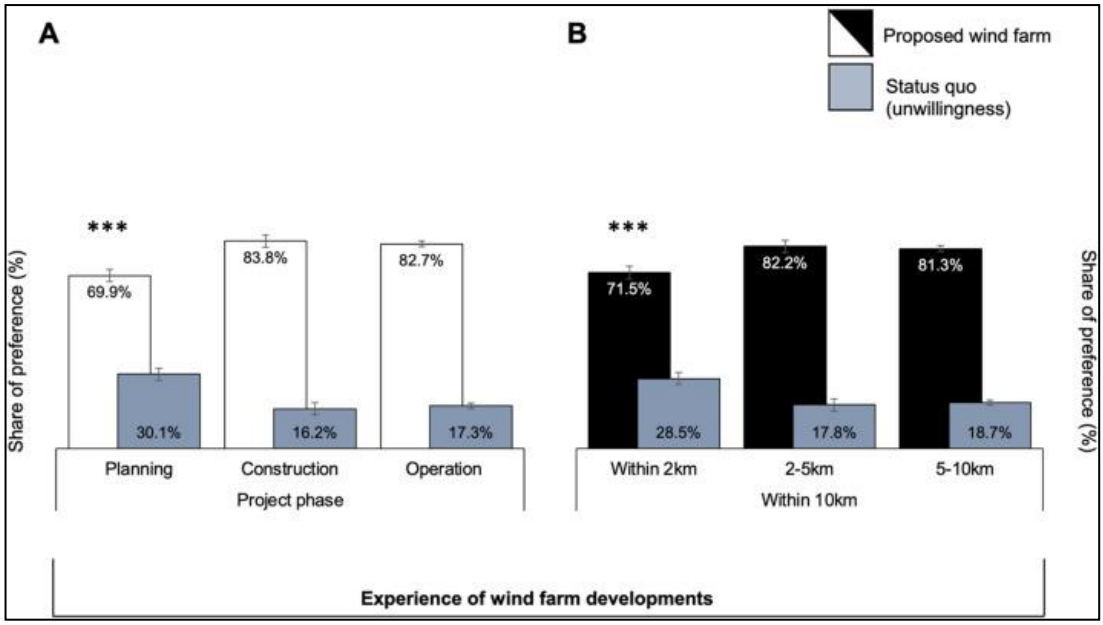

Figure 5-7 Share of preference for a 'best-case' combination of wind development features and the status quo (A) over phase of project development; and (B) over proximity to the wind farm. (Le Maitre et al. 2024)

Firstly, it should be highlighted that only 13% of the 1109 respondents (c. 144 persons) were unwilling to accept further wind farm development, with the remaining 87% being in favour of additional wind energy developments in their area. Similarly, it should be noted that a majority of respondents living next to operational wind farms were from the south-west region (i.e. Cork and Kerry) which have the largest number of operational turbines. Counties such as Dublin have fewer participants within the study due to the lack of turbines within 10km of the region As showcased in Figure 5-7 above, the survey findings suggest that residents who live within 10km of a wind farm development within the planning phase are more likely to be unwilling to accept further wind energy developments than those who live in proximity to a wind energy development either under construction, or within the operational phase. In all cases, a majority of respondents display moderate to strong willingness for additional wind energy developments in the area. Similarly, respondents living within 2km of a wind energy development are less likely to accept further wind energy developments than those within the 2-10km near neighbour zone.

Regarding respondents' opinions concerning wind electricity, 62% of 'status quo' respondents believed that wind energy was a "clean renewable source", when compared to 89% respondents with willingness to accept. Furthermore 65% of 'status quo' respondents believe that wind farm developments can negatively impact tourism. Similarly, 'status quo' respondents were very unlikely to trust information from a website run by the wind farm developer (only 20% very likely to trust), however, this sentiment was common amongst all latent classes, with 54% and 69% of respondents with moderate and strong willingness to accept further renewable energy developments respectively, being very likely to trust a developer run website. Worth noting is the fact that for each latent class, respondents were more likely to trust a community liaison officer or an information pack provided by a developer.

To conclude, this study illustrates that whilst negative sentiment towards wind energy developments is common at the planning phases, these sentiments generally subside during the construction and operational phases of the development. Similarly, respondents unwilling to accept wind energy development held negative personal opinions on wind energy generation when compared to those with willingness to accept. This report also highlights the importance of a strong community consultation process.

5.3.4 Health

5.3.4.1 Introduction

The assessment of human health for the Existing Development has been undertaken in accordance with the EPA, 2022, the Institute of Environmental Management and Assessment's guide to *Determining Significance for Human Health In Environmental Impact Assessment* (IEMA, 2022) and *Health In Environmental Impact Assessment: A Primer for a Proportionate Assessment* (IEMA, 2017).

5.3.4.1.1 *Baseline*

Ireland has the highest self-perceived health status in the EU, with 80% of people rating their health as 'good' or 'very good'. Health status reflects income inequality, with fewer low-income earners reporting good health both in Ireland and across the EU[34].

Table 5-12 below details the general health of persons by percentage for the State, County Donegal and the Population Study Area for the years 2016 and 2022, which have data publicly available. In general, the percentage health breakdown for the State, County and Study Area populations are very similar. The Population Study Area, State and County all reported in the range of 80-90% for a combined 'very good' and 'good' health rating. In 2016, 61.1% of people within the Population Study Area reported that their health was 'very good', whereas in 2022, that figure declined to 54.5%. In 2016, 26.7% of people within the Population Study Area reported that their health was 'good', and in 2022, this figure increased to 32.4%. In 2022, 83% of people in Donegal stated that their health was 'good' or 'very good' compared with 86% in 2016. This is a similar trend to the national figures, which also showed a 4% decrease in the good/very good categories, from 87% to 83%.

Table 5-12 Percentage General Health Breakdown for the State, County Donegal and Population Study Area as reported in the 2016 and 2022 Census. (Source: CSO)

	Very Good		Good		Fair		Bad		Very Bad		Not Stated	
	2016	2022	2016	2022	2016	2022	2016	2022	2016	2022	2016	2022
State	59.4%	53.2%	27.6%	29.7%	8.0%	8.6%	1.3%	1.4%	0.3%	0.3%	3.3%	6.7%
Donegal	56.7%	51.7%	28.9%	31.0%	9.8%	10.6%	1.5%	1.6	0.3%	0.4%	2.8%	4.6%
Population Study Area	61.1%	54.5%	26.7%	32.4%	8.8%	9.62%	1.3%	1.3%	0.3%	0.2%	1.9%	2.1%

As set out in the Department of Housing, Planning, Community and Local Government '*Key Issues Consultation Paper on the Transposition of the EIA Directive 2017*' and the guidance listed in Section 1.5.3 of Chapter 1: Introduction, the consideration of the effects on population and on human health should focus on health issues and environmental hazards arising from the other environmental factors, for example water contamination, air pollution, noise, accidents, disasters.

Chapter 8: Land, Soils and Geology, Chapter 9: Hydrology and Hydrogeology, Chapter 10: Air, Chapter 11: Climate, Chapter 12: Noise and Vibration and Chapter 15: Material Assets (Traffic and Transport) provide an assessment of the effects of the Existing Development on these areas of

[34] Department of Health, Government of Ireland (2023) *Health in Ireland – Key Trends 2023.* https://www.gov.ie/pdf/?file=https://assets.gov.ie/285459/9f30e75f-c961-425f-80a9-92ed7bb279b1.pdf#page=null

consideration. There was the potential for adverse effects on human health from the Existing Development related to potential emissions to air from dust (Section 5.5.8), potential emissions to land and water of hydrocarbons and release of potentially silt-laden runoff into watercourses (Section 5.5.9) and noise emissions (Section 5.5.12). The potential for adverse health effects associated with the Existing Development during the construction phase is considered in Section 5.4 below.

5.3.4.2 Human Health and Climate Change

The Donegal County Council Local Authority Draft Climate Action Plan 2024–2029[35] (LACAP) outlines a strategic approach to become climate resilient, biodiversity rich, environmentally sustainable and carbon neutral by no later than 2050 by addressing key emissions sectors such as agriculture, residential energy use, and land use.

Overall, the greenhouse gas emissions generated from County Donegal equated to 1,970,000 tCO2eq in the baseline year, 2019. The top emitting sectors within the county in terms of total greenhouse gas emissions in the baseline year were Agriculture (39%), Residential and Land Use (21%), and Land Use Change and Forestry (15%). In 2019, Irelands national emissions totalled 65,152,000 tCO2eq, with County Donegal being responsible for approximately 3% of this. Due to its geographical location, County Donegal will see an increase in sea level rise which will place its coastal communities in vulnerable positions to ongoing climate change impacts.

The Met Éireann weather station at Malin Head Co. Donegal, which is located approximately 78 km to the north of the Wind Farm Site, is the nearest weather and climate monitoring station to the Wind Farm Site and Grid Connection Site that has meteorological data recorded for the 30-year period from 1990-2020. The Met Éireann weather station in Clones is located closer to the Site, however this weather station only has data for the 30-year average period from 1978-2007, which has been deemed an inappropriate timescale to determine weather in the existing environment. The wettest months are November and December, with April and May being the driest. August is the warmest month with an average temperature of 17.1° Celsius.

More recent monthly meteorological data recorded at Finner Camp, Co. Donegal, located approximately 46.5 km to the southwest of the Grid Connection Site, from January 2022 to December 2025 is available at: https://www.met.ie/climate/available-data/monthly-data. February 2022 was the wettest month in this time period, with 180.2mm of rainfall recorded, while September 2024 was the driest month with 44.2mm of rainfall. June 2023 was the warmest month in this time period, with a mean monthly temperature of 16.8° Celsius. December 2022 was the coldest month in this time period, with a mean monthly temperature of 4.4° Celsius.

The worksheet models and online tools calculate that the Prospective Development will give rise to 144,929 tonnes of CO_2 equivalent losses over its 25-year life. Of this total figure, the proposed turbines directly account for 76,329 tonnes, or 52.7%. Losses due to backup account for 43,641 tonnes, or 30.1%. Losses from reduced carbon fixing potential accounts for 0.3% or 439 tonnes. Losses from soil organic matter, i.e., CO2 loss from disturbed soil and subsoils, will equate to 21,999 tonnes, or 15.2%. Losses due to pre construction activities account for 162 tonnes or 0.1%, while losses due to construction activities account for 73 tonnes or 0.1%. Losses due to embodied carbon accounts for 2,164 tonnes or 1.5% and losses due to construction phase transport emissions accounts for 0.1% or 122 tonnes. The effects of climate change on human health are identified in the Climate Change Sectoral Adaptation Plan 2025- 2030[36]. Identified effects range from risks associated with sea level rise and coastal flooding such as disruption and damage to healthcare services, risks associated with extreme weather (cold, precipitation, flooding, heat) such as physical injury and mental health and risks associated with global

[35] Donegal County Council (2024) *Local Authority Climate Action Plan 2024-2029.* https://consult.donegal.ie/en/system/files/materials/792/DCC%20Climate%20Action%20Plan_Web.pdf
[36] *Department of Environment, Climate and Communications. (2025) Climate Change Sectoral Adaptation Plan. Available at:* https://www.climateireland.ie/adaptation/adaptation-guidance-and-plans/sectoral-adaptation-guidance/

average temperature risk such as increased aeroallergen levels, higher rates of skin cancer, and decreased indoor air quality.

5.3.4.3 Human Health and Noise

Environmental noise is unwanted and harmful sound created by human activities, including noise emitted by means of transport, road traffic, rail traffic, air traffic and noise in agglomerations over a specified size. Types of noise not included under Directive 2002/49/EC of the European Parliament and of the Council relating to the assessment and management of environmental noise (2002), transposed into Irish law by the European Communities (Environmental Noise) Regulations 2018 (SI No. 549/2018) is noise that is caused by the exposed person, noise from domestic activities, noise created by neighbours, noise at workplaces or noise inside means of transport or due to military activities in military areas.

Baseline noise levels have been surveyed at two representative NSLs in the vicinity of the Wind Farm Site. Noise predictions for the nearest NSLs have been prepared for all key elements of the Prospective Development that have the potential for noise and vibration effects. Based on detailed information on the site layout, turbine noise emission levels and turbine hub height, turbine noise levels have been predicted at NSLs for a range of operational wind speeds. The predicted noise levels associated with the Prospective Development will be within the best practice noise limits recommended in the Guidelines (DoEHLG, 2006). Therefore, it is not considered that a significant effect is associated with the Prospective Development.

Further information on Noise can be found in Chapter 12: Noise and Vibration, which assesses the potential noise and vibration impacts of the Prospective Development. The assessment includes mitigation and monitoring measures for the construction, operational and decommissioning phase of the Prospective Development.

5.3.4.4 Human Health and Air Quality

The Air Quality Framework Directive 96/62/EC (CEC, 1996) details how ambient air quality should be monitored, assessed, and manged. The Air Quality Index of Health is based on hourly monitoring data from monitoring stations around Ireland and is based on measurements of five air pollutants which are particularly harmful to human health[37].

- Ozone gas
- Nitrogen dioxide gas
- Sulphur dioxide gas
- Particulate Matter (PM2.5)
- PM10

Poor air quality is a major health risk, causing lung diseases, cardiovascular diseases and cancer. Particularly vulnerable groups include children, the elderly and citizens with respiratory conditions.

Air pollution can have considerable economic impacts, including high medical costs and undermining productivity through lost working days. The EPA operates two monitoring stations in County Donegal, both located in Letterkenny, approximately 26 km north of the Wind Farm Site.

Air quality surrounding the Prospective Development is generally good and typical of a clean, rural environment. The Site is located within EPA Air Quality Zone D, which represents rural areas with little industry or dense traffic. Data from nearby EPA monitoring stations show that concentrations of key pollutants such as sulphur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter (PM_{10} and

[37] EPA (2024) *Air Quality in Ireland: Report 2023.* https://www.epa.ie/publications/monitoring-assessment/air/Air_Quality_Report_23_v13_flat.pdf

$PM_{2.5}$), carbon monoxide (CO), and ozone (O_3) are well below national and EU limit values. The Prospective Development will have no significant effect of air quality in the vicinity of the Site. Further information pertaining to air quality can be found in Chapter 10: Air Quality

5.3.4.5 Seveso III Sites

The Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015) (the "COMAH Regulations"), implement the Seveso III Directive (2012/18/EU). The purpose of the COMAH Regulations is to lay down rules for the prevention of major accidents involving dangerous substances, and to seek to limit as far as possible the consequences for human health and the environment of such accidents, with the overall objective of providing a high level of protection in a consistence and effective manner. There are two categories of major accidents establishments, Upper Tier and Lower Tier. These are defined based on the volume(s) of the dangerous substances present.

There are no Seveso sites in the surrounding area of the Prospective Development nor within the Population Study Area. The closest Seveso site to the Prospective Development is European Refreshments (trading as Ballina Beverages) situated on Killala Road, Ballina, Co. Mayo, approximately 97 km southwest of the Site.

5.3.4.6 Water Quality

There are no underground water or sewerage networks within the Wind Farm Site. There is a water mains pipeline, including several associated hydrants and valves, that runs along a section of the N15, within the Grid Connection Site. This pipeline begins at Biddys O'Barnes pub at Barnesmore Gap, and runs within/parallel to the N15 national road in a south-westerly direction where it re-routes off the N15 onto the L-2595 local road toward Clogher Substation. Along the L-2595 Local Road there is a stop-valve and water pipe 'junction' where a different section of pipeline begins and continues along the L-2595 Local Road in a southerly direction, passing the junction leading to Clogher Substation.

Regarding groundwater resources, the Geographical Survey Ireland do not map the presence of any National Federation registered Group Water Schemes (GWS) or Public Water Schemes (PWS) or an associated Source Protection Area (SPA) within the Site or in the surrounding lands. A search of private well locations (accuracy of 1 – 50 m only) was undertaken using the GSI well database (www.gsi.ie). The GSI database recorded no wells within the Site. The closest well is approximately 16.5km east of the Site.

Regarding Surface Water Quality, there are no mapped Drinking Water Protected Areas (DWPA) within or immediately downstream of the Site. The closest DWPA is Lough Mourne located upstream of the Site. However, Uisce Éireann abstract water from the Bunadowen River within the Wind Farm Site and pump it to Lough Mourne Reservoir (EU Code: IE_NW_01_104), approximately 1.7km to the north. This abstraction is currently not mapped on the online Water Framework Directive (WFD) database (www.catchments.ie).

In the Donegal Bay North Catchment, the Eske_020 River Water Body (RWB) (EU Code: IE_NW_37E050400) upstream of Donegal Town and downstream of Lough Eske is listed as a DWPA, located approximately 4.5 km southwest of the Site. Within Northern Ireland, the Derg/Strule catchment is identified as a DWPA.

An information request was submitted to Uisce Éireann to identify any additional water resources within a 5km buffer of the Wind Farm Site. No additional surface water resources were identified. The only abstraction location identified was from Lough Mourne upstream of the Site. Further detail on the impact assessment and mitigation measures of these water resources is provided in Section 9.5 of Chapter 9: Hydrology and Hydrogeology, of this EIAR.

5.3.4.7 Traffic and Transport

The large wind turbine components will be delivered to the Wind Farm Site, from Killybegs Port via the Turbine Delivery Route (TDR), as discussed in Section 15.1 of Chapter 15 of this EIAR.The TDR exits Killybegs Port and travels northeast on the R263 Regional Road for approximately 2.8km to a point where the road changes to the N56 National Road. From this point the TDR travels east on the N56 National Road for approximately 25.6km to the Drumlonagher Roundabout situated on the east side of Donegal Town. From this point the TDR heads northeast on the N15 National Road for approximately 13.4 km to the location of the existing Wind Farm Site entrance located in the Townland of Croaghonagh. A detailed autotrack assessment of the potential pinch points on the TDR was undertaken based on the largest vehicle that will negotiate the route, which is the extended transport vehicle carrying the turbine blades – please see Appendix 15-1 for further details. The total length of the turbine delivery route is approximately 42km.

Construction materials such as concrete, and steel will follow the same transport route as the wind farm turbines components from the National Road network to the Wind Farm Site and BMEP Site. All construction vehicles entering the Wind Farm Site will enter from the south and north, via the existing Wind Farm Site entrance junction on the N15 National Road. All concrete required for each of the remaining 5 turbine foundations will be delivered to the Wind Farm Site in one day per foundation over a total of 5 days. All concrete and other deliveries provided by local quarries, if required, will access the Wind Farm Site via the existing Wind Farm Site entrance junction off the N15 National Road.

Further details on existing traffic volumes for the anticipated construction year are provided in Section 15.1 of Chapter 15 of this EIAR.

5.3.4.8 Health Effects of Wind Farms

5.3.4.8.1 *Health Impact of Wind Farm Studies*

While there are anecdotal reports of negative health effects on people who live very close to wind turbines, peer-reviewed research has not supported these statements. There is currently no published credible scientific evidence to positively link wind turbines with adverse health effects. The main publications supporting the view that there is no evidence of any direct link between wind turbines and health are summarised below.

1. ***'Wind Turbine Sound and Health Effects – An Expert Panel Review',*** *American Wind Energy Association and Canadian Wind Energy Association, December 2009*[38]

This expert panel undertook extensive review, analysis and discussion of the large body of peer-reviewed literature on sound and health effects in general, and on sound produced by wind turbines in particular. The panel assessed the plausible biological effects of exposure to wind turbine sound. Following review, analysis, and discussion of current knowledge, the panel reached consensus on the following conclusions:

- "*There is no evidence that the audible or sub-audible sounds emitted by wind turbines have any direct adverse physiological effects.*
- *The ground-borne vibrations from wind turbines are too weak to be detected by, or to affect, humans.*
- *The sounds emitted by wind turbines are not unique. There is no reason to believe, based on the levels and frequencies of the sounds and the panel's experience with*

[38] https://www.novoco.com/public-media/documents/awea_soundwhitepaper_121109_0.pdf

sound exposures in occupational settings, that the sounds from wind turbines could plausibly have direct adverse health consequences."

The report found, amongst other things, that:

- "*Wind Turbine Syndrome" symptoms are the same as those seen in the general population due to stresses of daily life. They include headaches, insomnia, anxiety, dizziness, etc.*
- *Low frequency and very low-frequency 'infrasound' produced by wind turbines are the same as those produced by vehicular traffic and home appliances, even by the beating of people's hearts. Such 'infrasounds' are not special and convey no risk factors;*
- *The power of suggestion, as conveyed by news media coverage of perceived 'wind-turbine sickness', might have triggered 'anticipatory fear' in those close to turbine installations.*"

2. ***'Wind Turbine Syndrome – An independent review of the state of knowledge about the alleged health condition',*** *Expert Panel on behalf of Renewable UK, July 2010*[39]

This report consists of three reviews carried out by independent experts to update and understand the available knowledge of the science relating to infrasound generated by wind turbines. This report was prepared following the publication of a book entitled '*Wind Turbine Syndrome*', in 2009 by Dr. Pierpont, which received significant media attention at the time. The report discusses the methodology and assessment carried out in the 2009 publication and assessed the impact of low-frequency noise from wind turbines on humans. The independent review found that:

- "*The scientific and epidemiological methodology and conclusions drawn (in the 2009 book) are fundamentally flawed;*
- *The scientific and audiological assumptions presented by Dr Pierpont relating infrasound to WTD are wrong; and*
- *Noise from Wind Turbines cannot contribute to the symptoms reported by Dr. Pierpont's respondents by the mechanisms proposed.*"

Accordingly, the consistent and scientifically robust conclusion remains that there is no evidence to demonstrate any significant health effects in humans arising from noise at the levels of that generated by wind turbines.

3. ***'The Health Effects of 72 Hours of Simulated Wind Turbine Infrasound: A Double-Blind Randomized Crossover Study in Noise-Sensitive Health Adults'*** *Woolcock Institute for Medical Research, New South Wales Australia*[40]

The purpose of this study was to examine the potential health effects of audible sound and inaudible infrasound has on noise sensitive adults over a period of 72 hours. Sufferers of wind turbine syndrome (WTS) have attributed their ill-health and particularly their sleep disturbance to the signature of infrasound. On this basis, the objectives of the study were to test the effects of 72 hours of infrasound exposure on human physiology, particularly sleep. The results of the study are outlined below:

- All staff and participants were asked whether they were able to differentiate in any way between infrasound and sham infrasound (the control), and none of them were able to.
- The study found that 72 hours of the simulated wind turbine infrasound (~90dB pk re 20 µPa) in controlled laboratory conditions did not worsen any measure of sleep

[39] http://psew.pl/en/wp-content/uploads/sites/2/2017/01/3b041e47d7f8029dfc10fee7d3249721.pdf
[40] https://pubmed.ncbi.nlm.nih.gov/36946580/

quality compared with the same speakers being present but not generating infrasound (sham infrasound).

- The study found no evidence of that 72 hours of exposure to a sound level of ~90dB pk re 20 µPa of simulated wind turbine infrasound in double-blind conditions perturbed any physiological or psychological variable.
- None of the participants in the study who were exposed to infrasound developed what could be described as WTS.
- This study suggests that the infrasound component of WTS is unlikely to be a cause of any ill-health or sleep disruption, although this observation should be independently replicated.

4. ***'A Rapid Review of the Evidence',*** *Australian Government National Health and Medical Research Council (NHMRC) Wind Turbines & Health, July 2010*[41]

The purpose of this paper was to review evidence from current literature on the issue of wind turbines and potential effects on human health and to validate the finding of the '*Wind Turbine Sound and Health Effects - An Expert Panel Review*' (see Line Item 1 above) that:

- *"There are no direct pathological effects from wind farms and that any potential impact on humans can be minimised by following existing planning guidelines."*
- *There is currently no published scientific evidence to positively link wind turbines with adverse health effects.*
- *'This review of the available evidence, including journal articles, surveys, literature reviews and government reports, supports the statement that: There are no direct pathological effects from wind farms and that any potential impact on humans can be minimised by following existing planning guidelines.*"

5. ***'Position Statement on Health and Wind Turbines',*** *Climate and Health Alliance, February 2012*[42]

The Climate and Health Alliance (CAHA) was established in August 2010 and is a coalition of health care stakeholders who wish to see the threat to human health from climate change and ecological degradation addressed through prompt policy action. In its Position Statement in February 2012, CAHA states that:

> *"To date, there is no credible peer reviewed scientific evidence that demonstrates a direct causal link between wind turbines and adverse health impacts in people living in proximity to them. There is no evidence for any adverse health effects from wind turbine shadow flicker or electromagnetic frequency. There is no evidence in the peer reviewed published scientific literature that suggests that there are any adverse health effects from infrasound (a component of low frequency sound) at the low levels that may be emitted by wind turbines."*

The Position Statement explores human perceptions of wind energy and notes that some people may be predisposed to some form of negative perception that itself may cause annoyance. It states that:

> *"Fear and anxious anticipation of potential negative impacts of wind farms can also contribute to stress responses, and result in physical and psychological stress symptoms... Local concerns about wind farms can be related to perceived threats from changes to their place and can be considered a form of "place-protection action", recognised in psychological research about the importance of place and people's sense of identity."*

CAHA notes the existence of *"misinformation about wind power"* and, in particular, states that:

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[41] https://www.agl.com.au/content/dam/digital/agl/documents/about-agl/how-we-source-energy/coopers-gap-wind-farm/20100701-agl-nhmrc-wind-turbines-and-health.pdf
[42] https://www.agl.com.au/content/dam/digital/agl/documents/about-agl/how-we-source-energy/coopers-gap-wind-farm/caha-position-statement-health-wind-turbines.pdf

> *"Some of the anxiety and concern in the community stems originally from a self-published book by an anti-wind farm activist in the United States which invented a syndrome, the so-called "wind turbine syndrome". This is not a recognised medical syndrome in any international index of disease, nor has this publication been subjected to peer review."*

CAHA notes that:

> *"Large scale commercial wind farms however have been in operation internationally for many decades, often in close proximity to thousands of people, and there has been no evidence of any significant rise in disease rates."*

This, it states, contrasts with the health effects of fossil fuel energy generation.

6. ***'Wind Turbine Health Impact Study -Report of Independent Expert Panel'*** *– Massachusetts Departments of Environmental Protection and Public Health (2012)* [43]

An expert panel was established with the objective to, inter alia, evaluate information from peer-reviewed scientific studies, other reports, popular media and public comments and to assess the magnitude and frequency of any potential effects and risks to human health associated with the design and operation of wind energy turbines. In its final report, the expert panel set out its conclusions under several headings, including noise and shadow flicker.

In relation to noise, the panel concluded that there was limited or no evidence to indicate any causal link between noise from wind turbines and health effects, including the following conclusions:

> *"There is no evidence for a set of health effects, from exposure to wind turbines that could be characterized as a "Wind Turbine Syndrome."*
>
> *The strongest epidemiological study suggests that there is not an association between noise from wind turbines and measures of psychological distress or mental health problems. There were two smaller, weaker, studies: one did note an association, one did not. Therefore, we conclude the weight of the evidence suggests no association between noise from wind turbines and measures of psychological distress or mental health problems.*
>
> *None of the limited epidemiological evidence reviewed suggests an association between noise from wind turbines and pain and stiffness, diabetes, high blood pressure, tinnitus, hearing impairment, cardiovascular disease, and headache/migraine."*

In relation to shadow flicker, the expert panel found the following:

> *"Scientific evidence suggests that shadow flicker does not pose a risk for eliciting seizures as a result of photic stimulation.*
>
> *There is limited scientific evidence of an association between annoyance from prolonged shadow flicker (exceeding 30 minutes per day) and potential transitory cognitive and physical health effects."*

7. ***Wind Turbines and Health, A Critical Review of the Scientific Literature,*** *Massachusetts Institute of Technology (Journal of Occupational and Environmental Medicine Vol. 56, Number 11, November 2014)* [44]

This review assessed the peer-reviewed literature regarding evaluations of potential health effects among people living in the vicinity of wind turbines. The review posed a number of questions around the

[43] https://www.mass.gov/doc/wind-turbine-health-impact-study-report-of-independent-expert-panel/download
[44] https://pubmed.ncbi.nlm.nih.gov/25376420/

effect of turbines on human health, with the aim of determining if stress, annoyance or sleep disturbance occur as a result of living in proximity to wind turbines, and whether specific aspects of wind turbine noise have unique potential health effects. The review concluded the following with regard to the above questions:

- Measurements of low-frequency sound, infrasound, tonal sound emission, and amplitude-modulated sound show that infrasound is emitted by wind turbines. The levels of infrasound at customary distances to homes are typically well below audibility thresholds.
- No cohort or case–control studies were located in this updated review of the peer-reviewed literature. Nevertheless, among the cross-sectional studies of better quality, no clear or consistent association is seen between wind turbine noise and any reported disease or other indicator of harm to human health.
- Components of wind turbine sound, including infrasound and low frequency sound, have not been shown to present unique health risks to people living near wind turbines.
- Annoyance associated with living near wind turbines is a complex phenomenon related to personal factors. Noise from turbines plays a minor role in comparison with other factors in leading people to report annoyance in the context of wind turbines.

A further 25 reviews of the scientific evidence that universally conclude that exposure to wind farms and the sound emanating from wind farms does not trigger adverse health effects, were compiled in September 2015 by Professor Simon Chapman, of the School of Public Health and Sydney University Medical School, Australia, and is included as Appendix 5-1 of this EIAR. Another recent publication by Chapman and Crichton (2017) entitled '*Wind turbine syndrome; A communicated disease'* critically discusses why certain health effects might often be incorrectly attributed to wind turbines.

8. ***Environmental Noise Guidelines for the European Region:*** *World Health Organisation Regional Office for Europe, 2018.* [45]

The WHO Environmental Noise Guidelines provide recommendations for protecting human health from exposure to environmental noise originating from various sources such as transportation noise, wind turbine noise and leisure noise. The Guideline Development Group (GDG) defined priority health outcomes and from this were able to produce guideline exposure levels for noise exposure.

For average noise exposure, the GDG conditionally recommends reducing noise levels produced by wind turbines below 45 dB Lden. The GDG recognise the potential for increased risk of annoyance at levels below this value but cannot determine whether this increase risk can impact health. Wind turbine noise above this level is associated with adverse health effects.

The GDG points out that evidence on health effects from wind turbine noise (apart from annoyance) is either absent or rated low/very low quality. Furthermore, public perception towards wind turbines are hard to differentiate from reported effects related to noise and the two may be inextricably linked. The GDG also recognises that the percentage of people exposed to noise from wind turbines is far lower than other sources such as road traffic and state that any benefit from specifically reducing population exposure to wind turbine noise in all situations remains unclear.

That being said, the GDG recommends renewable energy policies include provisions to ensure noise levels from wind farm developments do not rise above the guideline values for average noise exposure. The GDG also provides a conditional recommendation for the implementation of suitable measures to reduce noise exposure, however, it states that no evidence is available to facilitate the recommendation of one type of intervention over another.

[45] https://www.who.int/europe/publications/i/item/9789289053563

9. ***Infrasound Does Not Explain Symptoms Related to Wind Turbines:*** *Finnish Government's Analysis, Assessment and Research Activities (VN TEAS), 2020.* [46]

The study targeted to adverse health effects of wind turbine infrasound and was funded by the Finnish Government's Analysis, Assessment and Research Activities (VN TEAS).

It was found that the low-frequency, inaudible sounds made by wind turbines are not damaging to human health despite fears that they cause unpleasant symptoms. The project, which was carried out over two years, examined the impact of low-frequency—or infrasound—emissions which cannot be picked up by the human ear.

People in many countries have blamed the infrasound waves for symptoms ranging from headaches and nausea to tinnitus and cardiovascular problems, researchers said.

Interviews, sound recordings and laboratory tests were used to explore possible health effects on people living within 20 kilometres (12 miles) of the generators.

The report notes:

> *'...the behavioral findings of the current study suggest that wind turbine infrasound cannot be reliably perceived and it does not result in increased annoyance. Participants that showed health effects did not show signs of increased infrasound sensitivity and did not rate wind turbine sounds more annoying.*

As a result:

> *'These findings do not support the hypothesis that infrasound is the element in turbine sound that causes annoyance. Instead, they suggest that people who have health symptoms which they associate with wind turbine sound are not likely to have these symptoms because they perceive turbine sound more annoying than controls, at least in laboratory settings. It is more likely that these symptoms are triggered by other factors such as symptom expectancy'.*

10. ***Impact of Wind turbines on Human Health and Safety:*** *Proceedings of Socratic Lectures, University of Ljubljana, 2025*

The purpose of this paper was to review evidence from current literature with regards to effects on noise emissions, infrasound, ice throw and visual impacts. The paper shows that these effects are either negligible or effectively mitigated by modern technologies and safety standards. It was noted that misinformation and psychological factors such as nocebo effects (psychological phenomenon in which negative expectations of a particular stimulus or situation lead to the perception of negative effects, even if there is no direct physical cause)

The paper concluded that the health benefits of wind energy such as reduction of air pollution and associated diseases, along with benefits such as energy security, job creation, and climate change mitigation outweigh the potential risks.

The paper looks to promote informed public dialogue so that the potential of wind energy can be fully realised in line with global efforts to combats climate change and protect public health.

[46] https://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/162329/VNTEAS_2020_34.pdf?sequence=1&isAllowed=yvergleichbar

5.3.4.8.2 Turbine Safety

Turbines pose no threat to the health and safety of the general public. The Guidelines (DoEHLG, 2006) and Draft Guidelines (DoHPLG, 2019) state that there are no specific safety considerations in relation to the operation of wind turbines. Fencing or other restrictions are not necessary for safety considerations and should be kept to a minimum. People or animals can safely walk up to the base of the turbines.

The Guidelines (DoEHLG, 2006) and the Draft Guidelines (DoHPLG, 2019) state that there is a very remote possibility of injury to people from flying fragments of ice or from a damaged blade. Modern turbine blades are composite structures with no bolts or separate components; therefore, danger is minimised. Furthermore, the proposed wind turbines will be fitted with anti-vibration sensors which will detect any imbalance caused by icing of the blades. These sensors will cause the turbine to wait until the blades have been de-iced prior to beginning operation. As such, turbines are designed in such a way that ice throw/projection is not a significant risk. Furthermore, the Site (and the State) falls within the International Energy Agency (IEA) Ice Class 1 Category, which correlates to a *Low* icing frequency.

The International Electrotechnical Commission (IEC) is a global organization that develops and publishes international standards for electrical and electronic technologies. One of the areas where the IEC has played a significant role is in the standardization of wind turbines. The IEC has developed a series of standards specifically for wind turbines, which cover various aspects such as design, testing, and performance. The IEC 61400-1 "*Wind turbines – Part 1: Design requirements*"[47] provides guidelines and requirements for the design of wind turbines, including considerations for environmental conditions. This standard covers a range of conditions that wind turbines may encounter, including those related to icing. It sets out criteria for the structural design, safety systems, and other aspects to ensure that wind turbines can operate safely and effectively in various environments. As such, the Prospective Development, and like those across Ireland and in many other countries, is generally designed and assessed according to international standards, with the IEC standards being frequently employed in this process. Additionally, regulatory entities and energy authorities at the national level, such as the SEAI, often refer to and align their guidance with internationally recognized standards, including those established by the IEC, such as IEC 61400-1 for wind turbines. In conclusion, the Prospective Development adheres to the criteria specified in both the IEC 61400-1 design requirements and the SEAI guidance.

Turbine blades are manufactured of fiberglass which will prevent any likelihood of an increase in lightning strikes within the Wind Farm Site or the local area. Lightning protection conduits will be integral to the construction of the turbines. Lightning conduction cables, encased in protection conduits, will follow the electrical cable run, from the nacelle to the base of the turbine. The conduction cables will be earthed adjacent to the turbine base. The earthing system is installed during the construction of the turbine foundations.

5.3.4.8.3 Electromagnetic Interference

The provision of underground electric cables of the capacity proposed is common practice throughout the country and installation to the required specification does not give rise to any specific health concerns.

The extremely low frequency (ELF) electric and magnetic fields (EMF) associated with the operation of the proposed cables fully comply with the international guidelines for ELF-EMF set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP), a formal advisory agency to the World Health Organisation, as well as the EU guidelines for human exposure to EMF. Accordingly, there will be no operational impact on properties (residential or other uses) as the ICNIRP guidelines will not be exceeded at any distances even directly above the cables.

[47] *IEC 61400-1 (2005). Available at: https://dlbargh.ir/mbayat/46.pdf*

The ESB document 'EMF & You' (ESB, 2017)[48] provides further practical information on EMF.

Further details on the potential effects of electromagnetic interference to telecommunications and aviation are presented in Section 15.2 of Chapter 15: Material Assets.

5.3.4.8.4 Effects on Human Health

As set out in the Department of Housing, Planning, Community and Local Government '*Key Issues Consultation Paper on the Transposition of the EIA Directive 2017*' [49]and the guidance listed in Section 1.2.1 of Chapter 1: Introduction, the consideration of the effects on populations and on human health should focus on health issues and environmental hazards arising from the other environmental factors, for example water contamination, air pollution, noise, accidents, disasters.

This EIAR Chapter alongside Chapter 8 Land, Soils and Geology, Chapter 9 Hydrology and Hydrogeology, Chapter 10 Air Quality, Chapter 11 Climate, Chapter 12 Noise and Vibration Chapter 13 Landscape and Visual, Chapter 14 Cultural Heritage and Chapter 15 Material Assets (including Traffic and Transport) provide an assessment of the effects of the Prospective Development on these areas of consideration. There is the potential for negative effects on human health during the wind farm construction phase related to potential emissions to air of dust, potential emissions to land and water of hydrocarbons, release of potentially silt-laden runoff into watercourses and noise emissions.

The Prospective Development design and mitigation measures outlined in Chapter 8 and Chapter 9 ensures that the potential for effects on the water environment are not significant. No effects on local water supplies are anticipated.

As set out in Chapter 9, potential health effects are mainly through the potential for surface and surface and groundwater contamination which may have negative effects on public and private water supplies and potential flooding. There are no mapped public or group water scheme groundwater protection zones in the area of the Site. Furthermore, no private wells are located in close proximity to the Prospective Development.. The Lough Mourne surface water abstraction is located within the Site. Chapter 9 Hydrology and Hydrogeology assess the potential for impact on public water supply and private wells during the construction, operation and decommissioning phases, the site design and mitigation measures outlined in the Chapter will ensure that no significant effects will occur on the water environment.

The detailed Flood Risk Assessment in Appendix 9-1 has also shown that the risk of the Prospective Development contributing to flooding is low.

As stated above, a wind farm is not a recognised source of pollution and is not considered to have ongoing significant emissions to environmental media and the subsequent potential for human health effects.

The Prospective Development is for the completion of the development of a renewable energy project, a wind farm, capable of offsetting carbon emissions associated with the burning of fossil fuels. During the operational stage the Prospective Development will have a long term, moderate, positive effect on air quality and climate as set out in Section 10.3.3.3 of Chapter 10 Air Quality and Section 11.5.3 of Chapter 11 Climate, which will contribute to positive effects on human health.

[48] *EMF & You: Information about Electric & Magnetic Fields and the electricity network in Ireland Available at: https://esb.ie/docs/default-source/default-document-library/emf-public-information_booklet_v9.pdf?sfvrsn=0.*
[49] *Department of Housing, Planning, Community and Local Government (2017) 'Key Issues Consultation Paper on the Transposition of the EIA Directive 2017'. Available at: https://www.publichealth.ie/sites/default/files/resources/IPH%20response%20to%20the%20key%20issues%20consultation%20paper%20on%20Transposition%20of%20EIA%20Directive%20201452EU.pdf*

The provision of aviation lighting on permitted turbines is a standard and accepted part of any wind farm development. This is a safety requirement of the Irish Aviation Authority (IAA). The standard lighting required by the IAA are medium intensity lights. Such lighting is designed specifically for aviation safety and is not intended to be overbearing or dominant when viewed from the ground thus striking a reasonable balance between aviation safety and visual effect. The IAA generally only confirm lighting arrangements required for wind farm developments once a consent is in place.

It is considered that aviation lighting on the proposed turbines will have no significant effect on human health, beyond increasing aircraft safety in the context of the Prospective Development. The applicant will continue its engagement with IAA as required in relation to aviation lighting. An assessment of impacts on aviation assets is included in Section 15.2.2 of Chapter 15 Material Assets.

The assessments show that the residual effects are not significant and do not have the potential to cause negative health effects for human beings. On this basis, the potential for negative health effects associated with the Prospective Development is imperceptible.

5.3.4.9 Vulnerability of the Development to Natural Disasters and Major Accidents

An assessment of the Prospective Development's vulnerability to natural disasters can be found in Chapter 16 of this EIAR. A brief discussion can be found below.

As outlined in Section 5.2.2.3 above, a wind farm is not a recognised source of pollution. Should a major accident or natural disaster occur, the potential sources of pollution onsite during the construction, operational and decommissioning phases, are limited. Sources of pollution with the potential to cause significant environmental pollution and associated negative effects on health, such as bulk storage of hydrocarbons or chemicals, storage of wastes etc., are limited.

In the context of the Prospective Development, there is limited potential for significant natural disasters to occur. Ireland is a geologically stable country with a mild temperate climate. The potential natural disasters that may occur are therefore limited to peat instability, flooding and fire. The risk of peat instability and failure (landslide) occurring on the Wind Farm Site is addressed in the Peat Stability Assessment Report included in Appendix 8-1 of this EIAR which concludes that the Wind Farm Site has an acceptable margin of safety and is suitable for the completion of the wind farm development. The risk of flooding and potential for contamination of surface and groundwater and drinking water due to the construction of the Prospective Development is addressed in Chapter 9 Hydrology and Hydrogeology, with the risk being limited due to the proposed mitigation measures and site drainage plan, meaning there is limited risk to human health. It is considered that the risk of significant fire occurring, affecting the wind farm and causing the wind farm to have significant environmental effects is limited and therefore a significant effect on human health is similarly limited. As described earlier, there are no significant sources of pollution in the wind farm with the potential to cause environmental or health effects. Also, the spacing of the turbines and distance of turbines from any properties limits the potential for effects on human health. The issue of turbine safety is addressed in Section 5.3.4.8.2

Major industrial accidents involving dangerous substances pose a significant threat to humans and the environment; such accidents can give rise to serious injury to people or serious damage to the environment, both on and off the site of the accident. The Site is not regulated under the Control of Major Accident Hazards Involving Dangerous Substances Regulations i.e. SEVESO sites and so there are no potential effects from this source. The nearest SEVESO site to the Site (LSS Oil Terminal, Co. Derry) is approximately 52.5km northeast of the nearest proposed turbine (T19). A Major Accidents and Natural Disasters assessment is included as Chapter 16.

5.3.5 Property Values

5.3.5.1 Property Values and Wind Farms

In the absence of any Irish studies on the effects of wind farms on property values, this section summarises the largest and most recent studies from the United States and the UK.

One of the largest studies of the impact of wind farms on property values has been carried out in the United States. '*The Impact of Wind Power Projects on Residential Property Values in the United States: A multi-Site Hedonic Analysis*', December 2009, was carried out by the Lawrence Berkley National Laboratory (LBNL) for the U.S Department of Energy[50]. This study collected data on almost 7,500 sales of single-family homes situated within ten miles of 24 existing wind farms in nine different American states over a period of approximately ten years. The conclusions of the study are drawn from eight different pricing models including repeat sales and volume sales models. Each of the homes included in the study were visited to demonstrate the degree to which the wind facility was visible at the time of the sale, and the conclusions of the report state that *"The result is the most comprehensive and data rich analysis to date on the potential impacts of wind energy projects on nearby property values."*

The main conclusion of this study is as follows:

> *"Based on the data and analysis presented in this report, no evidence is found that home prices surrounding wind facilities are consistently, measurably, and significantly affected by either the view of wind facilities or the distance of the home to those facilities. Although the analysis cannot dismiss the possibility that individual or small numbers of homes have been or could be negatively impacted, if these impacts do exist, they are either too small and/or too infrequent to result in any widespread and consistent statistically observable impact."*

This study has been updated by LBNL who published a further paper entitled "*A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States*", in August 2013[51]. This study analysed more than 50,000 home sales near 67 wind farms in 27 counties across nine U.S. states yet was unable to uncover any impacts to nearby home property values. The homes were all within 10 miles of the wind energy facilities - about 1,100 homes were within 1 mile, with 331 within half a mile. The report is therefore based on a very large sample and represents an extremely robust assessment of the impacts of wind farm development on property values. It concludes that:

> *"Across all model Specifications, we find no statistical evidence that home prices near wind turbines were affected in either the post-construction or post announcement/pre-construction periods."*

The LBNL studies note that their results do not mean that there will never be a case of an individual home whose value goes down due to its proximity to a wind farm – however if these situations do exist, they are considered to be statistically insignificant.

In September 2023, the Energy Policy Journal published '*Commercial wind turbines and residential home values: new evidence from the universe of land-based wind projects in the United States.*'[52] This study targeted urban counties in the United Stated with populations over 250,000 persons, and found that on average, after a commercial wind energy project is announced, houses located within 1 mile of a

[50] *LBNL (2019) The Impact of Wind Power Projects on Residential Property Values in the United States: A multi-Site Hedonic Analysis. Available at: https://emp.lbl.gov/publications/impact-wind-power-projects*
[51] *LBNL (2013) A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States. Available at: https://emp.lbl.gov/publications/spatial-hedonic-analysis-effects-wind*
[52] *Energy Policy (2023) Commercial wind turbines and residential home values: new evidence from the universe of land-based wind projects in the United States. Available at: https://www.sciencedirect.com/science/article/pii/S0301421523004226*

proposed wind energy project experience a decrease in value of 11% relative to homes located within 3-5 miles of the proposed wind energy project. The decline in property values was found to recover post construction with property value impacts becoming relatively small (~2%) and statistically insignificant 9 years or more after project announcement (roughly 5 years after operation begins). This suggests that the housing market is reacting negatively to the expectation of likely impacts (after announcement) and the heightened activity during construction, but after operation begins, those negative perceptions and related home price impacts appear to fade.

The US-based scientific literature on the topic is therefore inconclusive, with the studies summarised above providing contradictory conclusions. The text below summarises the UK studies on the topic.

A study was commissioned by RenewableUK and carried out by the Centre for Economics and Business Research (Cebr) in March 2014. The findings of the study were produced in a report titled '*The Effect of Wind Farms on House Prices'* [53]and its main conclusions are:

- Overall, the analysis found that the county-wide property market drives local house prices, not the presence or absence of wind farms.
- The econometric analysis established that construction of wind farms at the five Sites examined across England and Wales has not had a detectable negative impact on house price growth within a five-kilometre radius of the Sites.

A study issued in October 2016 '*Impact of Wind Turbines on House Prices in Scotland'* (2016) [54] was published by Climate Exchange. Climate Exchange is Scotland's independent centre of expertise on climate change which exists to support the Scottish Governments policy development on climate and the transition to a low carbon economy.

The report presents the main findings of a research project estimating the impact on house prices from wind farm developments. It is based on analysis of over 500,000 property sales in Scotland between 1990 and 2014. The key findings from the study (p.3) are:

- No evidence of a consistent negative effect on house prices: Across a very wide range of analyses, including results that replicate and improve on the approach used by Gibbons (2014), we do not find a consistent negative effect of wind turbines or wind farms when averaging across the entire sample of Scottish wind turbines and their surrounding houses. Most results either show no significant effect on the change in price of properties within 2km or 3km or find the effect to be positive.
- Results vary across areas: The results vary across different regions of Scotland. Our data does not provide sufficient information to enable us to rigorously measure and test the underlying causes of these differences, which may be interconnected and complex.

The most recent review which has been published in July 2025 by RenewableUK '*Do wind farms affect house prices*?'[55] looks at the research which has been conducted in recent years to assess the concerns brought upon by the growing development of renewable energy infrastructure (wind turbines and above ground grid infrastructure) across the UK. The review concludes that there are a complex number of factors influencing house prices which play a much more significant role than the presence of wind farm of above ground electricity infrastructure. Based on the review of available research across the UK, there is no supporting evidence which supports the hypothesis that renewable energy infrastructure negatively affects long-term property values in the UK.

[53] *RenewableUK, Cebr (2014) The Effect of Wind Farms on House Prices. Available at: https://tethys.pnnl.gov/sites/default/files/publications/RenewableUK_2014.pdf*
[54] *Climate Exchange (2016) Impact of wind Turbines on House Prices in Scotland. Available at: https://www.climatexchange.org.uk/wp-content/uploads/2023/09/cxc_wind_farms_impact_on_house_prices_final_17_oct_2016.pdf*
[55] *RenewableUK (July 2025). Blog post: Do wind farms affect house prices?. Available at: https://www.renewableuk.com/news-and-resources/blog/do-wind-farms-affect-house-prices/*

The UK scientific literature is strong in its conclusions that there are no significant effects on the change in price of properties close to wind farm developments, and that generally the county-wide property market drives local house prices, not the presence or absence of wind farms. This literature is contradictory to the working paper containing the only Irish study on the topic.

The literature described above demonstrates that there is insufficient evidence from the scientific literature and studies conducted to determine that there is the potential for a significant effect on property values as a result of the Prospective Development. No studies specific to an Irish context were accessible to the public at the time of writing.

5.3.5.2 Property Values and Grid Infrastructure

In May 2016, EirGrid conducted a literature review and evidence-based field study on the effects of high voltage transmission development on patterns of settlement and land use. The objectives of EirGrid Evidence Based Environmental Studies Study 9: Settlement and land use[56] were to:

- To gather information on patterns of settlement and land use near to existing transmission infrastructure.
- To establish the effects of existing transmission infrastructure on patterns of settlement and land use.
- To review land use planning policy in various Development Plans to determine whether any policy change has arisen as a result of the construction and operation of existing transmission projects.

A literature review of transmission projects from around the world was carried out, including review of Environmental Impact Assessments (EIAs). To investigate effects of transmission projects on patterns of land use and settlement, 31 case studies were chosen; 17 with existing overhead line (OHL) circuits, 10 with substations and 4 in construction. Sites were located in rural, rural/urban and urban areas. Land uses included agricultural, commercial and amenity. Four control sites had no infrastructure. Coexistence, development density, planning policy and planning application history were all investigated. Planning and land use policy over the last twenty years was reviewed to see if it has influenced, or been influenced, by recent programmes of transmission infrastructure development. This study has established no evidence of any significant impact arising from the construction or existence of transmission infrastructure in terms of patterns of settlement and land use; however, transmission infrastructure can be a local physical constraint on development.

The Grid Connection Site is existing and is located underground and based on the literature review and evidence-based field study described above the Grid Connection Site has been scoped out of the assessment.

5.3.6 Residential Amenity

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

The Wind Farm Site is located within a rural, agricultural setting in eastern Donegal, approximately 8km southwest of the twin towns of Ballybofey and Stranorlar and approximately 12km northeast of Donegal Town. Current land-use on the Wind Farm Site comprised of the partially constructed Meenbog Wind farm, areas of commercial forestry and blanket bog, and public roadways. The surrounding land-use predominantly comprises peat bogs, commercial forestry and other seminatural

[56] *EirGrid (2016) EirGrid Evidence Based Environmental Studies Study 9: Settlement and land use. Available at: https://cms.eirgrid.ie/sites/default/files/publications/EirGrid-Evidence-Based-Environmental-Study-9-Settlement-and-Landuse.pdf*

areas with limited residential use along local and public roads. The identified land uses within and around the Wind Farm Site will be retained in the surrounding landscape during the operational phase of the Prospective Development. This continuation of existing activities and land use will assist in the assimilation of the Prospective Development into the current receiving environment.

The BMEP Site is located to the northeast of the Wind Farm Site, in lands that are highly influenced and modified by past and existing commercial forestry land use. Once the BMEP Site measures have been implemented, it will provide positive increases in biodiversity and restoration of the landscape from the highly modified commercial forestry to the establishment of a mosaic of open heathland and patchy scrub vegetation. The land use surrounding the BMEP Site consists of residential dwelling clusters, the local road network and commercial forestry, the visual changes to the landscape include positive changes to landcover arising from deforestation of forestry, enhancement of hedgerows and planting and changes to the composition of grassland.

The Grid Connection Site is located entirely underground, and no construction works are necessary, thus this has been scoped out of the assessment of Residential Amenity. Residential Amenity is focused on the Wind Farm Site and BMEP Site.

When considering the amenity of residents in the context of a proposed wind farm project, there are three main potential impacts of relevance: 1) Shadow Flicker, 2) Noise, and 3) Visual Amenity. Shadow flicker and noise are quantifiable aspects of residential amenity while visual amenity is more subjective. Detailed shadow flicker and noise impact assessments have been completed as part of this EIAR (Section 5.3.7 refers to shadow flicker assessment, Chapter 12 addresses noise and vibration). A comprehensive landscape and visual impact assessment have also been carried out, as presented in Chapter 13 of this EIAR. Impacts on the local population during the construction, operational and decommissioning phases of the Prospective Development is assessed in relation to each of these key topics and other environmental factors such as noise, traffic, and dust; see impacts in Section 5.4 below. The impact on residential amenity is then derived from an overall judgement of the combination of impacts due to shadow flicker, changes to land-use and visual amenity, noise, traffic, dust and general disturbance.

There are 4 no. sensitive receptors located within 1 kilometre of the proposed turbines. Of these 4 no. sensitive receptors, 3 no. are participating properties and 1 no is derelict. All inhabitable sensitive receptors achieve the minimum distance of 500m from any proposed turbine in compliance with the Guidelines (DoEHLG, 2006).

CAP25 was published in April 2025 by the Department of Environment, Climate and Communications. The associated Annex of Actions, which includes CAP24 Legacy Actions identifies the aim of publishing revised onshore wind energy guidelines in Q1 2025(Action EL/24/5). At the time of writing, the Draft Guidelines (DoHPLG, 2019) have not yet been adopted, and the relevant guidelines for the, remain to be the Guidelines (DoEHLG, 2006). However, due to the timelines associated with the planning process for renewable energy projects and the commitment within both CAP24 and CAP25 to publish new wind energy guidelines for onshore wind in Q1 2025, there is potential that updated guidelines will be published as a National Planning Statement (subject to the enactment of the relevant section of the Planning and Development Act 2024). It is considered that since noise emissions and shadow flicker are controllable via inbuilt turbine technologies, therefore, the Prospective Development is capable of compliance with any future guideline limits in this regard.

The closest third-party sensitive receptor is located approximately 752 m from the nearest proposed turbine (T17), i.e. over the recommended 4x tip height setback (626m) distance as recommended in the Draft Guidelines (DoHPLG, 2019)) for the purposes of visual amenity.

5.3.7 Shadow Flicker Assessment Results

5.3.7.1 Daily and Annual Shadow Flicker

WindPRO computer software was used to model the predicted daily and annual shadow flicker levels in significant detail, identifying the predicted daily start and end times, maximum daily duration and the individual turbines predicted to give rise to shadow flicker.

The model results assume worst-case conditions, including:

- 100% sunshine during all daylight hours throughout the year,
- No cloud cover during all daylight hours throughout the year,
- An absence of any screening (vegetation or other buildings),
- That the turbine rotors are facing the property, and
- That the turbine rotors are moving.

The maximum shadow flicker model assumes that daylight hours consist of 100% sunshine. This is a conservative assumption which represents theoretical precautionary conditions. Following the detail provided above on sunshine hours, a sunshine factor of 29.79% has been applied. Taking these probabilities into consideration, an approximation of the 'estimated actual' annual shadow flicker occurrence has been calculated and is presented in Table 5-13.

The predicted maximum daily and annual shadow flicker levels are then considered in the context of the Guidelines (DoEHLG, 2006) daily threshold of 30 minutes per day and annual threshold of 30 hours per year. If there is a predicted exceedance of the threshold limits at any property, the turbines that contribute to the exceedance are also identified.

The Guidelines (DoEHLG, 2006) recommend that shadow flicker at dwellings within 500 metres of a proposed turbine location should not exceed a total of 30 minutes per day or 30 hours per year. As detailed in Section 5.2.3.5 there are no inhabitable sensitive receptors less than 500 metres from the proposed turbine locations.

The predicted shadow flicker levels have been modelled for all 4 no. properties located within the Shadow Flicker Study Area. The predicted shadow flicker model results (as presented in Table 5-13 below) indicate:

- 4 no. properties are theoretically predicted to experience some shadow flicker;
  - It should be noted that of these 4 no. properties, 3 no. are inhabitable Participating Properties, and 1 no. is a derelict property. As a result, mitigation measures are not required for these 4 no. properties. Please see Table 5-13 below for details.
- The annual threshold of over 30 hours for shadow flicker (Guidelines (DoEHLG, 2006)) is predicted to be exceeded at 1 no. property once the regional sunshine average factor of 29.79% has been considered.
  - This 1 no. property is a Participating Property, in which mitigation measures are not required.

Figure 5-3 illustrates the houses that are potentially impacted by shadow flicker exceedances from the Prospective Development.

It is worth noting that the predicted exceedances of shadow flicker listed in Table 5-13 is considered conservative and in reality, the occurrence and/or duration of shadow flicker at these properties is likely to be eliminated or significantly reduced as the following items are not considered by the model:

- Receivers may be screened by topography, cloud cover and/or vegetation/built form i.e. adjacent buildings, farm buildings, garages or barns;
- Each receiver will not have windows facing in all directions onto the wind turbines.
- At distances, greater than 500-1000m 'the rotor blade of a wind turbine will not appear to be chopping the light but the turbine will be regarded as an object with the sun behind it. Therefore, it is generally not necessary to consider shadow casting at such distances' (Danish Wind Industry Association, accessed 2010).

Section 5.4.3.2.7 below details the mitigation measures which will be employed at the potentially affected properties to ensure that the current adopted Guidelines (DoEHLG, 2006) are complied with at any property within the Shadow Flicker Study Area. The same mitigation measures (with stricter implementation of shadow flicker controls) can be implemented so that that the proposed turbines can be operated in accordance with the shadow flicker requirements of the Draft Guidelines (DoHPLG, 2019), should they be adopted as currently proposed, while the planning application is being determined.

Table 5-13 Potential Daily & Annual Shadow Flicker – Meenbog Wind Farm, Co. Donegal.

House ID	ITM Coordinates (Easting)	ITM Coordinates (Northing)	Dwelling ID used in 2017 EIAR	Distance to Nearest Turbine (metres)	Nearest Proposed Turbine No.	Max. Daily Shadow Flicker: Pre-Mitigation (hrs:min:sec)	Max. Annual Shadow Flicker: Pre-Mitigation (hrs:min:sec)	Max. Annual Shadow Flicker Adjusted for Average Regional Sunshine 29.79% (hrs:min:sec)	Proposed Turbine(s) Giving Rise to Daly Shadow Flicker Exceedance	Mitigation Strategy Required (Daily)	Mitigation Strategy Required (Annual)
H001	608051	887579	Dwelling* 257	752	T17	01:18:00	102:21:00	30:29:24	T13, T15, T16, T17, T18	No	No
H002	609702	887805	Dwelling* 256	833	T19	00:38:00	31:26:00	9:21:50	T19	No	No
H003	609836	887713	Dwelling* 255	875	T19	00:36:00	23:15:00	6:55:34	T19	No	No
H004	609933	887584	Dwelling** 254	894	T19	00:35:00	20:02:00	5:58:05	T19	No	No

**Indicates Involved Landowner*
***Indicates Derelict Dwelling*

5.3.7.1 Cumulative Shadow Flicker

The cumulative assessment of shadow flicker arising from the Prospective Development and other wind farms was carried out based on the methodology, assumptions and criteria outlined in Section 5.2.3.

There are 4 no. existing, permitted, or proposed wind farms within 5km of the proposed turbines. The existing Barnesmore Wind Farm with a rotor diameter of 39m, the existing Straness Wind Farm with a rotor diameter of 90m, the permitted Barnesmore Repowering with a rotor diameter of 158m and the proposed Meenakeeran Wind Farm with a maximum rotor diameter of 132m. While there is overlap of the Shadow Flicker Study Areas of 10 times rotor diameter between the proposed turbines and the permitted Barnesmore Repowering, as shown in Figure 5-8 below. There are no sensitive receptors within the cumulative shadow flicker study area.

Therefore, there is no potential for shadow flicker in combination with the Prospective Development and therefore no cumulative shadow flicker assessment is required.

Figure 5-8 illustrates the zone of potential for cumulative shadow flicker between the Prospective Development, and the Permitted Barnesmore Repowering project

603000
606000
609000
888000
885000
882000
N
H001
H002
H003
H004
Croaghonagh
Meenbog
Meenafea
Croaghmacowna
Croaghconnollagh
Barnesmore
Croaghonagh
Cross Hill
Pollaweddy
Sixth Corgary or Second Croagh
CROSS HILL
Fifth Corgary or First Croa
Croaghnakeadew
Killeter Forest
Nature Reserve
Meenakeeran
Middle Town
Meenabrock
ARDNAMONA
Slievedoo
Nature Reserve
Clogher Hill
Croaghmeen
Croaghnaker
0
2.5
5 km

Map Legend

- Planning Application Boundary
- Proposed Turbine Layout
- Barnesmore Repowering Turbine Layout
- Barnesmore Repowering 1.58km Shadow Flicker Study Area
- Prospective Development 1.33km Shadow Flicker Study Area
- Dwellings within Shadow Flicker Study Areas

Spatial Reference
Name: IRENET95 Irish Transverse Mercator
Datum: IRENET95
Projection: Transverse Mercator

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SITE LOCATION - NOT TO SCALE

Drawing Title
Cumulative Shadow Flicker Study Area

Project Title
Meenbog Wind Farm, Co. Donegal

Project No.	Drawing No.	Scale
240505g	5-8	1:57,812
Drawn By	Checked By	Date
SOR	RK	01/07/2026

Email: info@mkoireland.ie/ Website: www.mkoireland.ie

5.4 Likely Significant Effects and Associated Mitigation Measures

The below assessment evaluates the impact (where there is the potential for an impact to occur) on population levels, employment and investment, land-use patterns and activities, property values, tourism, residential amenity, health and safety, dust, water quality, noise and vibration, traffic and transport, major accidents and natural disasters, and shadow flicker during the construction, operation, and decommissioning phases, as a result of the Prospective Development.

5.4.1 'Do Nothing' Scenario

If the Prospective Development were not to proceed, the Existing Development will remain in-situ as an unauthorised and partially completed wind farm, which is, in effect, the "Do-Nothing" option insofar as it represents the current situation as at the date of the application for Substitute Consent.

If the Prospective Development were not to proceed, the opportunity to capture a significant part of the country's renewable energy resource by completing the Meenbog Wind Farm would be lost, as would the opportunity to contribute to meeting Government and EU targets for the production and consumption of electricity from renewable resources and the reduction of greenhouse gas emissions. The opportunity to generate local employment, local authority development contributions, rates and investment in the local area would also be lost. Furthermore, the opportunity to implement the proposed biodiversity enhancement measures within the site would be lost.

5.4.2 Construction Phase

5.4.2.1 Population

5.4.2.1.1 *Population Levels*

Pre-Mitigation Impacts

Those working on the construction phase of the Prospective Development will travel daily to the Wind Farm Site from the wider area. The construction phase will have no effect on the population of the area in terms of changes to population trends or density, household size or age structure.

Mitigation and Monitoring Measures

No mitigation required.

Residual Effects

No residual effects.

Significance of Effects

The effects on population levels arising during the construction phase of the Prospective Development are considered to be Not Significant.

5.4.2.1.2 *Employment and Investment*

Pre-Mitigation Impacts

The construction of the Prospective Development will provide employment for technical consultants, contractors and maintenance staff. Completion of construction of the Prospective Development would require approximately 70 employees in total, with the majority of these roles focused on the construction phase. The construction phase of the Prospective Development will last approximately 12 months. Many construction workers and materials will be sourced locally, thereby helping to sustain employment in the construction trade. This will have a short-term slight positive impact.

The Prospective Development will result in an influx of skilled people into the area, bringing specialist skills for both the construction and operational phases that could result in the transfer of these skills into the local workforce, thereby having a long-term positive effect on the local skills base. Up-skilling and training of local staff in the particular requirements of the wind energy industry is likely to lead to additional opportunities for those staff as additional wind farms are constructed in Ireland. The injection of money in the form of salaries and wages to those employed during the construction phase of the Prospective Development has the potential to result in an increase in household spending and demand for goods and services in the local area. This would result in local retailers and businesses experiencing a short-term positive effect on their cash flow. This will have a long-term slight positive indirect effect. Wind Energy Ireland estimates that there were over 6,000 people employed in roles related to wind energy in Ireland in 2026. This figure is anticipated to grow significantly in the coming years as the race to achieve the targets set out in CAP25 accelerates.

Mitigation and Monitoring Measures

No mitigation required.

Residual Effects

This will have a short-term moderate positive indirect residual effect.

Significance of Effects

The effects on employment and investment arising during the construction phase of the Prospective Development are considered to be Not Significant.

5.4.2.1.3 *Land Use Patterns & Activities*

Pre-Mitigation Impacts

Current land-use at the Site is comprised of the partially constructed Meenbog Wind Farm, areas of commercial forestry and blanket bog, and roadways. The surrounding land-use predominantly comprises peat bogs, commercial forestry and other seminatural areas with limited residential use along local and public roads.

Please note, as stated in Section 4.4.1.9 of Chapter 4, both permanent and temporary felling is proposed as part of the Prospective Development. Within the Wind Farm Site, ~9ha of permanent felling and ~4ha of temporary felling is required, whilst the felling required within the BMEP Site totals ~110ha of permanent felling (note, this comprises the ~108ha to be felled for hen harrier habitat enhancement, and additional felling to facilitate the access to the BMEP Site). The forestry felling activities required as part of the Prospective Development will be the subject of a Limited Felling Licence (LFL) application to the Forest Service in accordance with the Forestry Act 2014 and the Forestry Regulations 2017 (SI 191/2017) and as per the Forest Service's policy on granting felling licenses for wind farm

developments. The policy requires that a copy of the planning permission for the Proposed Wind Farm be submitted with the felling licence application; therefore, the felling licence cannot be applied for until such time as planning permission is obtained for the Prospective Development. A derogation will be sought in relation to the felling requirements at the BMEP Site, and if obtained, no replanting will be required for the felling that is undertaken. In the event that this derogation is not obtained, the replanting obligation for the felling undertaken at the BMEP Site be replanted on a hectare for hectare basis outside the hydrological catchment within which the Prospective Development is located

The removal of 121.5 ha of commercial forestry crop will result in a change of land use of these areas. The Prospective Development will therefore have a short-term slight negative direct effect, which is not significant, on land use.

Mitigation and Monitoring Measures

The following measures will be adhered to for the Prospective Development. Please refer to Chapter 18 Schedule of Mitigation and Monitoring Measures for a full list of measures.

- The identified 108 ha of forestry that will be permanently felled as part of the BMEP Site will not be replaced or replanted and a derogation will be sought from the Forestry Service as part of the condition of any felling licence that will be issued in respect of the Site felling (Section 4.4.1.9.1 of Chapter 4 of this EIAR).
- The identified ~9 hectares of conifer plantation that will be permanently felled for the Prospective Development within the Wind Farm Site will be replaced or replanted on a hectare for hectare basis as a condition of any felling licence that will be issued in respect of the Prospective Development felling. Replanting is a requirement of the Forestry Act and is primarily a matter for the statutory licensing processes that are under the control of the Forest service. The replacement of the felled forestry as part of the Prospective Development may occur on any lands, within the State benefitting from Forest Service Technical Approval[57] for afforestation, should the Subject Development receive planning permission.

Residual Effects

Based on the above assessment, there will be a permanent not significant negative residual effect on land use.

Significance of Effects

The effect on land use/activities due to the construction phase the Prospective Development infrastructure is Not Significant.

5.4.2.1.4 *Tourism*

Pre-Mitigation Impact

Given that there are currently no tourism attractions specifically pertaining to the Wind Farm Site and BMEP Site then there are no impacts on tourism associated with the construction phase of the Prospective Development.

The Wind Farm Site has some rural aesthetic qualities given the relative lack of buildings and infrastructure present. Aside from the partially constructed Meenbog Wind Farm, land use is mostly

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

comprised of peatland and commercial forestry, with some areas of agricultural fields; however, these views are common throughout the local area and due to the Wind Farm Site's commercial forestry land-use, it is noted that the landscape has been subject to substantial levels of human interference and modification.

With regard to tourist attractions and amenity use surrounding the Site, described in Section 5.3.2 above such as the Barnesmore Gap and the Northwest Cycle Trail, traffic management safety measures will be in place, where required. Please see Section 5.4.2.2.5 below for traffic impact mitigation measures and Section 15.1 of Chapter 15 Material Assets of this EIAR for mitigation measures relating to the Prospective Development.

Mitigation and Monitoring Measures

With regard to tourist attractions and amenity use surrounding the Prospective Development, traffic management safety measures will be in place, where required. Please see Section 5.4.2.2.5 below outlines the mitigation measures proposed in relation to traffic. Section 15.1 of Chapter 15 Material Assets details mitigation measures relating to the Prospective Development.

Residual Effects

Based on the above, it is concluded that there will be no residual effects on tourism in the wider landscape during the construction phase the Prospective Development.

Significance of Effects

The effect on tourism in the wider landscape due to the construction phase of the Prospective Development is Not Significant.

5.4.2.1.5 *Property Values*

Pre-Mitigation Impacts

As noted in Section 5.3.5 above, the available scientific literature demonstrates that there is insufficient evidence from the scientific literature and studies conducted to determine that there is the potential for a significant effect on property values as a result of a wind energy development. The impact assessment on property values outlined above takes a precautionary approach and assumes that based on the inconclusive evidence summarised above in Section 5.3.5, there is the potential for short-term slight negative impacts on property values, which is not significant, located within 1km of the proposed turbines during the construction phase of the Prospective Development. It should be noted that there are few dwellings located within the vicinity of the wind farm site, with 8 no. sensitive receptors located within 2km of the proposed turbines, of which 3 no. are participating properties and 1 no. is derelict.

Mitigation and Monitoring Measures

- All mitigation relevant to property values, outlined above and the corresponding chapters: Chapter 10 Air Quality, Chapter 12 Noise and Vibration, Chapter 13 Landscape, and Chapter 15 Material Assets of this EIAR, will be implemented in order to reduce insofar as possible, impacts on property values at properties located in the vicinity of the Prospective Development construction works. Please refer to Chapter 18 Schedule of Mitigation and Monitoring Measures for a full list of measures.
- The Prospective Development has been designed in accordance with the parameters set out in the Guidelines (DoEHLG, 2006) and with cognisance of the Draft Guidelines (DoHPLG, 2019).

Residual Effects

With the above mitigation and monitoring measures adhered to, it can be concluded that there is the potential for a short-term negative imperceptible residual effect on property values from the construction phase of the Prospective Development.

Significance of Effects

The effect on property values due to the construction of the Prospective Development is Not Significant.

5.4.2.1.6 *Residential Amenity*

Pre-Mitigation Impact

The potential for impacts on residential amenity is discussed in Section 5.3.7 above. There is the potential for impacts on residential amenity during the construction phase of the Prospective Development due to air, traffic, noise and vibration emissions due to the presence of additional traffic and plant machinery. Dust emissions will have a short-term slight negative impact. Noise and vibration emissions will have a short-term slight negative impact. Traffic will have a short-term slight negative impact.

Mitigation and Monitoring Measures

All mitigation as outlined above and the corresponding chapters: Chapter 10 Air Quality, Chapter 12 Noise and Vibration, and Chapter 15 Material Assets will be implemented in order to reduce insofar as possible, impacts on residential amenity at properties located in the vicinity of Prospective Development construction works. Please refer to Chapter 18 Schedule of Mitigation and Monitoring Measures for a full list of measures.

Residual Effects

Based on the above, it is concluded that air, traffic, noise and vibrations emissions will result in a short-term, slight, negative residual effect on residential amenity due to the construction phase of the Prospective Development.

Significance of Effects

The effect on residential amenity due to construction phase the Prospective Development is Not Significant.

5.4.2.1.7 *Summary of Significance of Effects*

Section 5.4.2.1 above assess the potential likely significant effects on population during the construction phase of the Prospective Development. Based on the assessment of the relevant topics above, the construction phase of the Prospective Development will not result in any significant effects on population. The overall effect on population as a result of the construction phase of the Prospective Development is Not Significant.

5.4.2.2 Health

The following impact assessment is produced in accordance with guidance as set out in Section 5.2.2 above.

5.4.2.2.1 *Health and Safety*

Pre-Mitigation Impacts

Construction of the Prospective Development will necessitate the presence of a construction site and travel on the local public road network to and from the construction site. Construction sites and the machinery used on them pose a potential health and safety hazard to construction workers if site rules are not properly implemented. This will have a short-term potential significant negative impact on health and safety.

Mitigation and Monitoring Measures

The Prospective Development will be constructed in accordance with all relevant Health and Safety Legislation, including:

- Safety, Health and Welfare at Work Act 2005 (No. 10 of 2005);
- Safety, Health and Welfare at Work (General Application) (Amendment) Regulations 2016 (S.I. No. 36 of 2016);
- S.I. No. 528/2021 - Safety, Health and Welfare at Work (Construction) (Amendment) Regulations 2021 and
- Safety, Health and Welfare at Work (Work at Height) Regulations 2006 (S.I. No. 318 of 2006).

The following measures below are also detailed in Chapter 18 Schedule of Monitoring and Mitigation Measures.

- A Health and Safety Plan covering all aspects of the construction process will address the Health and Safety requirements in detail. This will be prepared on a preliminary basis at the procurement stage and developed further at construction stage.
- All hazards will be identified, and risks assessed. Where elimination of the risk is not feasible, appropriate mitigation and/or control measures will be established. The contractor will be obliged under the construction contract and current health and safety legislation to adequately provide for all hazards and risks associated with the construction phase of the project. Safepass registration cards are required for all construction, delivery and security staff. Construction operatives will hold a valid Construction Skills Certificate Scheme card where required. The developer is required to ensure a competent contractor is appointed to carry out the construction works. The contractor will be responsible for the implementation of procedures outlined in the Safety and Health Plan. Public safety will be addressed by restricting Site access during construction. Fencing will be erected in areas of the Wind Farm Site where uncontrolled access is not permitted.
- Goal posts will be established, where necessary, under overhead electricity lines for the entirety of the construction phase of the Wind Farm Site.
- The suitability of machinery and equipment for use near power lines will be risk assessed.
- All staff will be trained on operating voltages of overhead electricity lines running the Site. All staff will be trained to be aware of the risks associated with overhead lines. All contractors that may visit the Wind Farm Site are made aware of the location of lines before they come on to Site.

- Barriers will run parallel to the overhead line at a minimum horizontal distance of 6 metres on plan from the nearest overhead line conductor wire.
- When activities must be carried out beneath overhead lines, e.g., component delivery or substation construction, a Site-specific risk assessment will be undertaken prior to any works. The risk assessment must take into account the maximum potential height that can be reached by the plant or equipment that will be used prior to any works. Overhead line proximity detection equipment will be fitted to machinery when such works are required.
- Information on safe clearances will be provided to all staff and visitors.
- Signage indicating locations and health and safety measures regarding overhead lines will be erected in canteens and on Site.
- All staff will be made aware of and adhere to the Health & Safety Authority's '*Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) (Amendment) Regulations 2021*'[58]. This will encompass the use of all necessary Personal Protective Equipment and adherence to the Site Health and Safety Plan.

The scale and scope of the Prospective Development necessitates that a Project Supervisor Design Process (PSDP) and Project Supervisor Construction Stage (PSCS) are required to be appointed in accordance with the provisions of the Health & Safety Authority's *'Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2013'*. The PSDP appointed for the construction stage shall be required to perform his/her duties as prescribed in the Safety, Health and Welfare at Work (Construction) Regulations. These duties include (but are not limited to):

- Review previously identified hazards and identify any new hazards arising from the design or from the technical, organisational, planning or time related aspects of the project;
- Where possible, eliminate the hazards or reduce the risks;
- Communicate necessary control measures, design assumptions or remaining risks to the PSCS so they can be dealt with in the Safety and Health Plan;
- Ensure that the work of designers is coordinated to ensure safety;
- Organise co-operation between designers;
- Prepare a written Safety and Health Plan;
- Prepare a safety file for the completed structure and give it to the client; and
- Notify the Authority and the client of non-compliance with any written directions issued.

The PSCS appointed for the construction stage shall be required to perform his/her duties as prescribed in the Safety, Health and Welfare at Work (Construction) Regulations. These duties include (but are not limited to):

- Development of the Safety and Health Plan for the construction stage with updating where required as work progresses;
- Compile and develop safety file information.
- Reporting of accidents / incidents;
- Weekly Site meeting with PSCS;
- Coordinate arrangements for checking the implementation of safe working procedures. Ensure that the following are being carried out:
    - Induction of all Site staff including any new staff enlisted for the project from time to time;

[58] *Health & Safety Authority (2013) Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2013. Available at:* https://www.hsa.ie/eng/publications_and_forms/publications/construction/guidelines_on_the_procurement_design_and_management_requirements_of_the_safety_health_and_welfare_at_work_construction_regulations_2013_updated_.pdf

- Toolbox talks as necessary;
- Maintenance of a file which lists personnel on Site, their name, nationality, current Safe Pass number, current Construction Skills Certification Scheme (CSCS) card (where relevant) and induction date;
- Report on Site activities to include but not limited to information on accidents and incidents, disciplinary action taken and PPE compliance;
- Monitor the compliance of contractors and others and take corrective action where necessary; and
- Notify the Authority and the client of non-compliance with any written directions issued.

Residual Effects

With consideration of the implementation of the detailed mitigation measures and specially those measures outlined in the Peat Stability Risk Assessment to minimise the potential for a future peat slide, there will be a potential short-term, slight negative residual effect on health and safety during the construction phase of the Prospective Development.

Significance of Effects

Based on the assessment above the effects on health and safety during the construction phase of the Prospective Development are considered to be Not Significant.

5.4.2.2.2 *Air Quality: Dust and Exhaust Emissions*

Pre-Mitigation Impacts

Potential dust and exhaust emission sources during the construction phase of the Prospective Development include upgrading of existing access tracks and construction of new access roads, construction and completion of turbine and meteorological mast foundations, temporary construction compound, peat management areas, proposed enhancement and management and tree felling areas.

An increase in dust and exhaust emissions has the potential to cause a nuisance to sensitive receptors in the immediate vicinity of the Site. The entry and exit of construction vehicles from the Site may result in the transfer of mud to the public road, particularly if the weather is wet. This may cause nuisance to residents and other road users. The transport of volumes of stone to be transported into the Wind Farm Site and BMEP Site also has the potential to create dust, which could affect nearby sensitive receptors. These effects will have a short-term, slight, negative impact on air quality, which is not significant. The potential dust impacts that may occur during the construction phase of the Prospective Development are further described in Chapter 10 Air Quality of this EIAR.

Mitigation and Monitoring Measures

The following mitigation measures will be implemented during the construction of the Prospective Development.

- Sporadic wetting of loose stone surface will be carried out during the construction phase to minimise movement of dust particles to the air. In periods of extended dry weather, dust suppression may be necessary along haul roads to ensure dust does not cause a nuisance. Water bowser movements will be carefully monitored to avoid, insofar as reasonably possible, increased runoff.
- Turbines and construction vehicles 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.
- The transport of construction materials around the Site from the nearby quarry facilities will be covered by tarpaulin where necessary.
- The transportation of materials from the borrow pit around the Wind Farm Site will be covered by tarpaulin or similar covered vehicles where necessary.
- If necessary, excavated material will be dampened prior to transport to the spoil management areas.
- A Construction and Environmental Management Plan (CEMP) will be in place throughout the construction phase (see Appendix 4-3). The CEMP includes dust suppression measures.
- Groundworks (i.e., works with potential to create dust) will be supervised by an ECoW. The ECoW will regularly monitor adjacent Annex I habitat for signs of dust deposition or any other habitat degradation.

All mitigation as outlined in Chapter 10 Air Quality will be implemented in order to reduce insofar as possible, impacts on air quality in the vicinity of Wind Farm Site.

Please refer to Chapter 18 Schedule of Mitigation and Monitoring Measures for a full list of measures.

Residual Effects

Residual effects on air quality from dust and exhaust emissions associated with construction activities and machinery are considered to have a short-term imperceptible negative effect on air quality.

Significance of Effects

The effects on air quality from dust and exhaust emissions during the construction phase of the Prospective Development are considered to be Not Significant.

5.4.2.2.3 *Water Quality*

Pre-Mitigation Impacts

The construction phase ground works and use of plant on the Site may give rise to the potential release of suspended solids and hydrocarbons into surface and groundwaters. There are no underground water or sewerage networks at the Wind Farm Site infrastructure locations. There are no registered Group Water Schemes (GWS) or Public Water Schemes (PWS) or an associated Source Protection Area (SPA) within the Site or the surrounding lands. There are no mapped Drinking Water Protected Areas (DWPA) within or immediately downstream of the Site. The closest DWPA is Lough Mourne located upstream of the Wind Farm Site. However, Uisce Éireann abstract water from the Bunadowen River within the Wind Farm Site and pump it to Lough Mourne Reservoir, ~1.7km to the north. There is potential for short-term slight, negative, indirect effects on the Lough Mourne surface water drinking supply. Mitigation measures in relation to the protection of downstream surface water quality is described in detail for all construction phase activities in Chapter 9 Hydrology and Hydrogeology.

There are 18 no. watercourse crossing within the Wind Farm Site. Further details on watercourse crossings are provided in Section 9.5.2.8 of this EIAR. There are no private wells located in the vicinity of the Wind Farm Site. Chapter 9 Hydrology and Hydrogeology assesses the potential for impact on group water schemes and other public water supplies during the construction phase. The pre-mitigation impact on water quality is assessed as negative, imperceptible, indirect, long term, unlikely effect on drinking water supplies.

Mitigation and Monitoring Measures

A bespoke drainage design which includes but is not limited to interceptor drains, check dams, swales and ponds has been implemented on the Site and will be subject to review, finalisation and updating (if required), please see Section 4.5 in Chapter 4 for details on the different type of drainage measures to be implemented on the Wind Farm Site. Chapter 9 of this EIAR details all best practice and mitigation measures to minimise the potential for entrainment of suspended sediment or potential hydrocarbon leak. Please see Chapter 9 for details and Chapter 18 for a full list of mitigation and monitoring measures for the Prospective Development.

Residual Effects

With the implementation of the reviewed and updated drainage design and all mitigation measures listed in Chapter 9 Hydrology and Hydrogeology (separation distances, prevailing geology, topography and groundwater flowpaths), it is considered that the residual effects on water quality will be indirect, negative, imperceptible, short-term and unlikely.

Significance of Effects

The effects on water quality during the construction phase of the Prospective Development are considered to be Not Significant.

5.4.2.2.4 *Noise and Vibration*

Pre-Mitigation Impacts

There will be an increase in noise levels in the vicinity of the Wind Farm Site and BMEP Site during the construction phase, as a result of heavy machinery and construction work which has the potential to cause a nuisance to sensitive receptors located closest to the Prospective Development. The wind turbine construction noise assessment results, detailed in Section 12.6.2 of Chapter 12 Noise and Vibration, show that, under theoretical precautionary conditions, predicted construction noise levels from the Wind Farm Site are below the Category A Threshold Levels (lowest threshold in BS 5228) for all of the Noise Sensitive Locations (NSLs). For all scenarios, therefore, there would be no significant construction noise effects.

These effects will be short-term in duration. The noisiest construction activities associated with wind farm development are internal road/track upgrades, excavation and concrete pouring of the turbine bases. Excavation of all turbine bases except for T7 has been completed, which can typically be completed in five days however, and the main concrete pour is usually conducted within one day. 14 no. of the 19 no. proposed turbine foundations have already been excavated and poured.

Construction noise at any given noise sensitive location will be variable throughout the construction project, depending on the activities underway and the distance from the main construction activities to the receiving properties. The potential noise impacts that will occur during the construction phase of the Prospective Development are further described in Chapter 12 Noise and Vibration. The predicted pre-mitigation noise impacts during the construction of the Prospective Development are assessed as negative, slight and short-term.

Mitigation and Monitoring Measures

Best practice measures for noise control will be adhered to on-site during the construction phase of the Prospective Development to impacts associated with this phase of the development. Please refer to Chapter 12 Noise and Vibration and Chapter 18 Schedule of Mitigation and Monitoring Measures for a full list of measures.

- Limiting the hours during which site activities likely to create high levels of noise or vibration are permitted;
- Establishing channels of communication between the contractor/developer, Local Authority and residents;
- Monitoring typical levels of noise and vibration during critical periods and at sensitive locations;
- Selection of plant with low inherent potential for generation of noise and/ or vibration where practical;
- Placing of noise generating / vibratory plant as far away from sensitive properties as practical within the site constraints, and;
- The hours of construction activity will be limited to avoid unsociable hours where possible. Construction operations shall generally be restricted to between 7:00hrs and 19:00hrs Monday to Saturday. However, to ensure that optimal use is made of good weather periods or at critical periods within the programme (i.e. concrete pours, turbine component deliveries) it could occasionally be necessary to work out of these hours.

Residual Effects

With the implementation of the above mitigation measures, there will be an imperceptible to not significant, temporary to short-term, negative effect on health due to an increase in noise levels during the construction phase of the Prospective Development.

Significance of Effects

For the reasons outlined above, the effects on human health due to noise emissions from the Prospective Development during construction will be Not Significant.

5.4.2.2.5 *Traffic and Transport*

Pre-Mitigation Impact

It is proposed that large wind turbine components will be delivered from Killybegs Port and travel northeast on the R263 Regional Road for approximately 2.8km to a point where the road changes to the N56 National Road. From this point the TDR travels east on the N56 National Road for approximately 25.6km to the Drumlonagher Roundabout situated on the east side of Donegal Town. From this point the TDR heads northeast on the N15 National Road for approximately 13.4km to the location of the existing Wind Farm Site entrance which has been constructed to facilitate abnormal load delivery (detailed in Section 4.6.3 of Chapter 4). There are no significant turbine delivery route accommodation works required to facilitate the delivery of components to the Wind Farm Site. All deliveries of turbine components to the Wind Farm Site will follow this route. In addition, deliveries of concrete for the construction of the proposed turbine foundations will also use this existing Wind Farm Site entrance road which connects to the N15 National Primary Road to the west of the Site. Other non-turbine construction traffic e.g., Heavy Goods Vehicles (HGVs) and Light Goods Vehicles (LGVs) movements involved in the delivery of construction related materials will also enter the Site at the existing site entrance road located off the N15 to the west of the Site. There is a secondary entrance to the Wind Farm Site off the L-6554 Local Road to the north of the Wind Farm Site, which is proposed as a staff entrance for workers accessing the northern portion of the Wind Farm Site during the construction phase and for maintenance access during the operational phase, as well as vehicles travelling to and from the BMEP Sie. The proposed site entrance to the proposed amenity area is located on an existing forestry track, off the L-6554 Local Road, approximately 220 m west of the secondary Wind farm Site entrance to the Wind Farm Site.

The types of vehicles that will be required to negotiate the local network, carrying turbine components, represent abnormal size loads and a detailed assessment of the geometry of the proposed route was therefore undertaken. This will have a short term slight negative impact on local road users, which is not significant.

Mitigation and Monitoring Measures

A complete Traffic and Transport Assessment (TTA) of the Prospective Development has been carried out by Alan Lipscombe Traffic and Transport Consultants. The full results of the TTA are presented in Chapter 15: Material Assets. A Traffic Management Plan (TMP), included as Appendix 15-2 to the EIAR, has also been developed in order to minimise any potential effect on the local population during the construction phase of the Prospective Development due to traffic. The plan will be developed and implemented to ensure any effect is short term in duration and imperceptible in significance during the construction of the Prospective Development. Prior to commencement of any works, the occupants of dwellings in the vicinity of the proposed works will be contacted and the scheduling of works will be made known. Local access to properties will also be maintained throughout any construction works and local residents will be supplied with the number of the works supervisor in order to ensure that disruption will be kept to a minimum. Please refer to Chapter 18 Schedule of Mitigation and Monitoring Measures for a full list of measures.

Residual Effects

Once the TMP is implemented for the construction phase of the Prospective Development there will be a short-term slight negative residual effect on local road users.

Significance of Effects

Based on the assessment above, the effects on traffic from the Prospective Development during construction will be Not Significant.

5.4.2.2.6 *Major Accidents and Natural Disasters*

Pre-Mitigation Impacts

A risk register has been developed which contains all potentially relevant risks identified during the construction phase of the Wind Farm Site. Eight risks (Critical Infrastructure Emergencies, Severe Weather, Flooding, Peat Instability, Traffic Incident, Contamination, Fire/ Explosion and Collapse/Damage to Structures) specific to the construction phase have been identified and are presented in Chapter 16 Major Accidents and Natural Disasters. As outlined in 16.4.1 of this EIAR, the scenario with the highest risk score in terms of the occurrence of major accident and/or disaster during the construction is identified as 'Traffic Incident', 'Contamination' of the Site and risk of 'Fire/Explosion' during construction.

Mitigation and Monitoring Measures

- The Prospective Development has been designed and will be built in line with current best practice and, as such, mitigation against the risk of major accidents and/or disasters will be embedded through the design. In accordance with the provision of the European Commission '*Guidance on the preparation of Environmental Impact Assessment Reports'* 2017, a Risk Management Plan will be prepared and implemented on site to ensure an effective response to disasters or the risk of accidents. The plan will include sufficient preparedness and emergency planning measures.

- A Construction and Environmental Management Plan (CEMP) has been prepared for the Prospective Development and is included in Appendix 4-3 of this EIAR. Upon a grant of planning permission for the Prospective Development, the CEMP will be updated to reflect the conditions stipulated in the consent prior to the commencement of the development. The CEMP will be a live document maintained by the contractor that will work to ensure that potential risks of major accident and/or disaster are identified, avoided and mitigated, as necessary. Refer to Appendix 4-3 for the CEMP that sets out the minimum standards to be employed by the contractor.
- Potential effects associated with contamination during construction, operation and decommissioning are addressed fully in Chapter 8 Land, Soils and Geology, and Chapter 9 Hydrology and Hydrogeology. The mitigation measures outlined in Chapter 8 and Chapter 9 to protect environmental receptors as well as the procedures and measures described in the CEMP will ensure that the risk from these sources is low.
- Appendix 8-1 contains a comprehensive Peat Stability Risk Assessment, with its findings showing that the Wind Farm Site has an acceptable margin of safety, and is suitable for the Prospective Development, and includes detailed mitigation and control measures.
- The Prospective Development will also be subject to a fire safety risk assessment in accordance with Chapter 19 of the Safety, Health and Welfare at Work Acts 2005 to 2014, which will assist in the identification of any major risks of fire on site, and mitigation of the same during operation.

Please refer to Chapter 18 Schedule of Mitigation and Monitoring Measures which details all proposed mitigation and monitoring measures for the construction, operation and decommissioning of the Prospective Development.

Residual Effects

The impact assessment concludes that the risk of a major accident and/or disaster during the construction phase of the Prospective Development is considered 'low' in accordance with the '*Guide to Risk Assessment in Major Emergency Management*' (DoEHLG, 2010). It is considered that when the mitigation and monitoring measures outlined in the CEMP (Appendix 4-3) are implemented there will not be significant residual effect(s) associated with the construction of the Prospective Development.

Significance of Effects

Based on the risk assessment in Chapter 16, the effects to/from Major Accidents and Natural Disasters during the construction phase of the Prospective Development is Not Significant.

5.4.2.2.7 *Shadow Flicker*

Shadow flicker, which occurs during certain weather conditions due to the movement of wind turbine rotor blades, as described in Section 5.2.3 and Section 5.3.8 above, can only occur during the operational phase of a wind energy development. There are therefore no shadow flicker impacts associated with the construction phase of the Prospective Development. Any shadow flicker effects that occur in the operational phase of the proposed turbines will be short-term in duration and is dealt with under Section 5.4.3.2.7 below.

5.4.2.2.8 *Summary of Significance of Effects*

Section 5.4.2.2 above assess the potential likely significant effects on health during the construction phase of the Prospective Development. Based on the assessment of the relevant topics above, the construction phase of the Prospective Development will not result in any significant effects on health.

The overall effect on health as a result of the construction phase of the Prospective Development is Not Significant.

5.4.3 Operational Phase

5.4.3.1 Population

The effects set out below relate to the operational phase of the Prospective Development.

5.4.3.1.1 *Population Levels*

Pre-Mitigation Impacts

The operational phase of the Prospective Development will have no impact on the population of the area with regard to changes to trends, population density, household size or age structure.

Mitigation and Monitoring Measures

No mitigation required.

Residual Effects

No residual effects.

Significance of Effects

Based on the assessment above, the effects on population from the Prospective Development during operation will be Not Significant.

5.4.3.1.2 *Employment and Investment*

Pre-Mitigation Impacts

The operational phase will present an opportunity for mechanical-electrical contractors and craftspeople to become involved with the maintenance and operation of the Prospective Development. On a long-term scale, the Prospective Development will create approximately 2-3 jobs during the operational phase relating to the maintenance and control of the Wind Farm Site, having a long-term slight positive effect.

The injection of money in the form of Community Gain income and landowner payments to the landowners who are participating in the Prospective Development, where a rental agreement has the potential to result in an increase in household spending and demand for goods and services in the local area. This would result in local retailers and businesses experiencing a long-term positive impact on their cash flow. This will have a long-term slight positive indirect effect.

Rates payments for the Subject Development will contribute significant funds to Donegal County Council, which will be redirected to the provision of public services within the county. These services include provisions such as road upkeep, fire services, environmental protection, street lighting, footpath maintenance etc. along with other community and cultural support initiatives. This will have a long-term slight positive indirect effect.

Mitigation and Monitoring Measures

No mitigation required.

Residual Effects

During the operational phase of the Prospective Development there will be long-term slight positive indirect residual effect on employment and investment.

Significance of Effects

Based on the assessment above, the effects on employment and investment from the Prospective Development during operation will be Not Significant.

5.4.3.1.3 *Land Use Patterns and Activities*

Pre-Mitigation Impacts

The footprint of the Prospective Development will occupy only a small percentage of the Site; 22.9ha (2.2%) of the overall 1,018-hectare site. Commercial forestry practices will not be impacted during the operational phase. The upgrade of and addition of new roads throughout the Wind Farm Site will enable land access for agricultural and forestry activities. The proposed BMEP Site includes for the felling of approximately 108 hectares of forestry on peatland to create heath and bog habitats along with a mosaic of scrub. The restoration of this area will include an area of 6.2 hectares of wet blanket bog that will be enhanced through restoration measures, which will result in a significant positive effect on peatland habitats, through the permanent felling of conifers and enhancement of the peatland habitats. This will have a long-term moderate positive impact on land use.

As detailed in the Biodiversity Management and Enhancement Plan (BMEP) (Appendix 6-4) peatland restoration and hen harrier habitat restoration is proposed within the identified BMEP Site (Figure 3-1 in Appendix 6-4). The proposed peatland restoration will result in enhancement of peatland habitat on the BMEP Site, while also offsetting the losses of degraded wet heath to facilitate the Prospective Development and result in habitat of higher suitability for Hen Harrier, alongside the establishment of areas of patchy willow-dominated scrub. This will have a long-term moderate positive impact on land use.

Mitigation and Monitoring Measures

No mitigation required.

Residual Effects

Due to the small footprint of the Prospective Development infrastructure on a site scale and even more so on a local scale, the residual effect is considered negative, direct, not significant, permanent effect on land use and activities during the operational phase.

Significance of Effects

The effect on land use/activities due to the operational phase of the Prospective Development will be Not Significant.

5.4.3.1.4 *Tourism*

Pre-Mitigation Effect

There are no tourism attractions within or adjacent to the Wind Farm Site and BMEP Site that could be affected by the operation of the Prospective Development. The nearest identified tourist attraction is the Barnesmore Gap, located in Barnesmore, approximately 3.5km southwest from the nearest proposed turbine (T10). There is potential for visibility of the Wind Farm Site at this location, as outlined in Chapter 13 which determined that the proposed turbines will not significantly impact the landscape setting or key distinctive characteristics of the Barnesmore Gap.

Based on the literature review in Section 5.3.2 the majority of studies indicate that wind farm developments do not deter visitors to tourist attractions or scenic landscapes where turbines are visually evident. There are no impacts determined to arise.

Mitigation and Monitoring Measures

No mitigation required.

Residual Effects

It is considered that the Prospective Development will have a no residual effects on visitor experiences to attractions in the wider landscape.

Significance of Effects

The effect on tourism in the wider landscape due to the operational phase of the Prospective Development will be Not Significant.

5.4.3.1.5 *Property Values*

Pre-Mitigation Impacts

As noted in Section 5.3.5 above, the available scientific literature demonstrates that there is insufficient evidence from the scientific literature and studies conducted to determine that there is the potential for a significant effect on property values as a result of the Wind Farm Site. The impact assessment on property values outlined below takes a precautionary approach and assumes that based on the inconclusive evidence summarised above in Section 5.3.5, while there is the potential for long-term slight impacts on property values located within 1km of the proposed turbines during the early operational phase of the Wind Farm Site, there are no third party dwellings located with 1km of the proposed turbines.

Mitigation and Monitoring Measures

- All mitigation relevant to property values, outlined above and the corresponding chapters: Chapter 10 Air, Chapter 12 Noise and Vibration, Chapter 13 Landscape, and Chapter 15 Material Assets, will be implemented in order to reduce insofar as possible, impacts on property values at properties located in the vicinity of Wind Farm Site construction works. Please refer to Chapter 18 Schedule of Mitigation and Monitoring Measures for a full list of measures.
- The Wind Farm Site has been designed in accordance with the parameters set out in the Guidelines (DoEHLG, 2006) and with cognisance of the Draft Guidelines (DoHPLG, 2019).

Residual Effects

It can be concluded that there is the potential for a long-term, negative, not significant, residual effect on property values from the operational phase of the Prospective Development.

Significance of Effects

The effect on property values due to the Prospective Development is Not Significant.

5.4.3.1.6 *Residential Amenity*

Pre-Mitigation Effects

Potential impacts on residential amenity during the operational phase of the Prospective Development could arise primarily due to noise, shadow flicker or changes to visual amenity. This will have a long-term significant negative direct effect on residential amenity. Detailed noise and shadow flicker modelling have been carried out as part of this EIAR, which shows that the Prospective Development will be capable of meeting all required guideline limits in relation to noise and the shadow flicker set out in the Guidelines (DoEHLG, 2006), or the Draft Guidelines (DoHPLG, 2019) if adopted. The noise and vibration assessment is detailed in Chapter 12 of this EIAR. It should be noted that the Wind Farm Site will be operated in line with the noise thresholds imposed on the development by the consenting authority should permission be granted for the Prospective Development. The visual impact of the Prospective Development is addressed in Chapter 13: Landscape and Visual. The turbine locations have been designed to maximise turbine separation distances to dwellings in the area.

Potential impacts on residential amenity during the operational phase of the existing onsite 110kV substation could arise primarily due to noise and traffic and transport. Details on potential noise effects on NSLs for the existing onsite 110kV substation can be found in Section 12.6.3.2 of Chapter 12 Noise and Vibration of this EIAR. The traffic and transport effects of the existing 110kV onsite substation and the underground electrical cable have been assessed in Chapter 15 Material Assets of this EIAR also. The nearest sensitive receptor is located approximately 3.1km northeast of the existing onsite 110kV Substation location and will be further screened by hedgerows. This level of noise predicted is low and inaudible, and it is concluded that there will be no significant noise emissions from the operation of the existing onsite 110kV substation at any NSLs.

Impacts on telecommunications assets have the potential to negatively impact residential amenity. As part of the scoping and consultation exercise undertaken by MKO, the national and regional broadcasters and fixed and mobile phone operators were contacted with regard to potential interference from the Wind Farm Site. Full details are provided in Section 2.9 of the EIAR (in Chapter 2 Background and Policy) and Section 15.2 of the EIAR (in Chapter 15: Material Assets – Telecoms and Aviation). Copies of scoping replies received are presented in Appendix 2-2 of the EIAR. The Wind Farm Site will have no impact on telecommunications.

Mitigation and Monitoring Measures

- There are no turbines proposed within 626m (4 x tip height) of any sensitive receptors. As detailed above, the closest proposed turbine (T17) is 752m from the nearest - sensitive receptor, which is a participating property.
- All mitigation as outlined under noise and vibration, dust, traffic, visual amenity, shadow flicker, and telecommunications in this EIAR will be implemented in order to reduce insofar as possible impacts on residential amenity at properties located in the vicinity of the Prospective Development works, including along the proposed turbine and construction materials haul route.

Please refer to Chapter 18 Schedule of Mitigation and Monitoring Measures for a full list of measures.

Residual Effects

The residual effect is considered to be a long-term, slight negative, residual effect on residential amenity.

Significance of Effects

Based on the assessment above the effects on residential amenity during the operational life of the Prospective Development will be Not Significant.

5.4.3.1.7 *Summary of Significance of Effects*

Section 5.4.3.1 above assess the potential likely significant effects on population during the operational phase of the Prospective Development. Based on the assessment of the relevant topics above, the operational phase of the Prospective Development will not result in any significant effects on population. The overall effect on population as a result of the operational phase of the Prospective Development is Not Significant.

5.4.3.2 Health

5.4.3.2.1 *Health and Safety*

Pre-Mitigation Effect

Wind Farm Site

Rigorous safety checks and continued maintenance are conducted on the turbines and ancillary infrastructure during the operational phase to ensure there are no health and safety risks posed by the Wind Farm Site. This will have a potential long-term, slight negative effect on health and safety during the operational phase.

BMEP Site

The operational phase of the BMEP Site will have a temporary, imperceptible, negative effect on health and safety during the operational phase.

Grid Connection

Rigorous safety checks and continued maintenance are conducted along the underground cabling route during operation to ensure the risks posed to staff and landowners are negligible. The high voltage cable within the public road corridor is the main risk posed to staff. This will have a potential long-term, slight impact on health and safety during the operational phase.

Mitigation and Monitoring Measures

The following mitigation measures will be implemented during the operation of the Prospective Development to ensure that the risks posed to staff and landowners remain imperceptible throughout the operational life of the Prospective Development. Please refer to Chapter 18 Schedule of Mitigation and Monitoring Measures for a full list of mitigation and monitoring measures for the Prospective Development.

- Access to the turbines is through a door at the base of the structure, which will be locked at all times outside maintenance visits. The doors will only be unlocked as

required for entry by authorised personnel and will be locked again following their exit.

- Staff associated with the Prospective Development will conduct frequent visits, which will include inspections to establish whether any signs have been defaced, removed, faded, or are becoming hidden by vegetation or foliage, with prompt action taken as necessary.
- Signs will also be erected at suitable locations across the Site as required for the ease and safety of operation of the wind farm. These signs include:
    - Buried cable route markers at 50m (maximum) intervals and change of cable route direction;
    - Directions to relevant turbines at junctions;
    - "No access to Unauthorised Personnel" at appropriate locations;
    - Speed limits signs at Site entrance and junctions;
    - "Warning these Premises are alarmed" at appropriate locations;
    - "Danger HV" at appropriate locations;
    - "Warning – Keep clear of structures during electrical storms, high winds or ice conditions" at Site entrance;
    - "No unauthorised vehicles beyond this point" at specific Site entrances; and
    - Other operational signage required as per Site-specific hazards.
- The Onsite 110kV Substation, which is operated by EirGrid is locked and fenced off from public access. The substation is operated remotely and manually 24 hours per day, 7 days a week. Supervisory operational and monitoring activities are carried out remotely using a SCADA system, with the aid of computers connected via a telephone modem link.
- Servicing of the substation equipment will be carried out in accordance with the manufacturer's specifications, which would be expected to entail the following:
    - Six-month service – three-week visit
    - Annual service – six-week visit
    - Weekly and daily visits as required.
- An operational phase Health and Safety Plan will be developed to fully address identified Health and Safety issues associated with the operation of the Site. Access for emergency services will be available at all times.

Residual Effects

With the implementation of the above mitigation measures, there will be a long-term, negative, imperceptible residual effect on health and safety during the operational life of the Prospective Development.

Significance of Effects

Based on the assessment above the effects on health and safety during the operational life of the Prospective Development will be Not Significant.

5.4.3.2.2 *Air Quality: Dust and Exhaust Emissions*

Pre-Mitigation Effect

The Wind Farm Site will require daily visits of maintenance staff in LGVs and will produce dust and other emissions. The Grid Connection Site will only be visited by maintenance staff in the event of a fault and may on occasion, produce small volumes of dust and other emissions during the operational phase. Maintenance of the existing onsite 110kV infrastructure may, on occasion, generate of small volumes of dust and exhaust emissions. This will result in a long-term, slight, negative effect on air quality.

The Prospective Development will generate electricity from a renewable source, contributing to a positive impact on air quality. Over the envisaged 25-year lifespan of the Prospective Development it is expected to effectively reduce carbon dioxide emissions that would have occurred if the same energy were generated by traditional fossil fuel plants. This is a long-term moderate positive effect on air quality.

Residual Effects

Impacts from dust and other emissions to air from the maintenance of the Prospective Development on sensitive receptors during the operational phase of the Prospective Development is considered to be a brief and imperceptible effect. Overall, considering offsetting of dust and greenhouse gas emissions from fossil fuels as a result of the Prospective Development, there will be a long-term overall moderate positive effect on air quality.

Significance of Effects

Through the offsetting of dust and greenhouse gas emissions from fossil fuels, the Prospective Development is considered have No Significant Effects on air quality.

5.4.3.2.3 *Water Quality*

Pre-Mitigation Impact

During the operational phase of the Prospective Development all permanent drainage controls will be in place and the disturbance of ground and excavation works will be complete. Some minor maintenance works may be completed, such as maintenance of the Site entrance, internal roads and hardstand areas. These works would be of a very minor scale and would be very infrequent. During such maintenance works there is a small risk associated with the release of hydrocarbons from Site vehicles, although it is not envisaged that any significant refuelling works will be undertaken on Site during the operational phase. Therefore, there will be a negative, slight, indirect, temporary, unlikely impact on human health due to a potential deterioration of water quality.

Mitigation and Monitoring Measures

The mitigation measures detailed in Chapter 9 Hydrology and Hydrogeology will ensure all surface water runoff from upgraded roads and new road surfaces (including hardstand and turbine base areas) will be captured and treated prior to discharge/release. Settlement ponds, checks dams and interceptor drains will prevent roads acting as preferential flowpaths by providing attenuation and water quality treatment. Please see Chapter 9 for details. The full list of mitigation and monitoring measures for the Prospective Development are detailed in Chapter 18.

Residual Effects

With the implementation of the Site drainage design and mitigation measures the residual effects on human health due to water quality are considered to be negative, imperceptible, indirect, temporary, and unlikely.

Significance of Effects

Based on the assessment above, the effects on water quality will be Not Significant.

5.4.3.2.4 *Noise and Vibration*

Pre-Mitigation Effect

A baseline assessment of the existing background noise conditions was carried out, the results of which are presented in Chapter 12 Noise and Vibration of the EIAR. An assessment of the operational wind turbine noise levels has also been undertaken, in accordance with best practice guidelines and procedures as outlined in Chapter 12 Noise and Vibration of this EIAR, through modelling of the development using noise prediction software. A precautionary omni-directional turbine noise prediction assessment has been carried out using the ISO 9613-2 calculation standard and best practice guidance for turbine noise prediction contained in the IOA GPG. These calculations are based on theoretical precautionary conditions favourable to noise propagation, i.e., downwind propagation from source to receiver and/or downward refraction under temperature inversions. Table 12-20 in Chapter 12 of this EIAR: Noise & Vibration presents the result of the turbine noise predictions and assessment review at all the NSLs within the study area. Please note, the level of noise from the Grid Connection Site underground cabling route will be negligible and will only occur during maintenance or monitoring activities.

The predicted noise levels at various wind speeds have been compared against the noise criteria curves outlined in Section 12.3.2.5.6 of Chapter 12 and are below the day and night-time criteria in all cases. Predicted noise levels are presented in Appendix 12-6.

Considering that there is no significant traffic expected on site roads during the operational phase and the significant distances from any site road to the nearest NSL; there are no noise and vibration impacts anticipated from wind farm roads during the operational phase.

Mitigation and Monitoring Measures

Please see Chapter 12, Section 12.7 for noise and vibration mitigation and monitoring proposals for the Prospective Development. Please refer to Chapter 18: Schedule of Mitigation and Monitoring Measures for a full list of mitigation and monitoring measures for the Prospective Development.

Residual Effects

The predicted residual operational turbine noise effects at the closest noise sensitive locations are summarised as from long term, not significant and negative Please see Chapter 12 Noise and Vibration for details.

Significance of Effects

As stated in the noise assessment in Chapter 12, it has been demonstrated that the relevant national guidance in relation to noise associated with proposed wind turbines, site roads and the existing onsite 110kV Substation can be satisfied. The effects are considered Not Significant.

5.4.3.2.5 *Traffic and Transport*

Pre-Mitigation Effect

Major component failures are considered unlikely and therefore the presence of abnormal load vehicles and HGVs at the Wind Farm Site is considered extremely rare. Should a turbine component need replacing, the measures detailed in Section 5.4.2.2.5 and Chapter 15 will be implemented.

All site visits for maintenance and inspection purposes for the Wind Farm Site will be done so via LGVs with one or two LGVs each day.

Visits to the on-site 110kV substation by EirGrid and/or the Wind Farm operator for maintenance and inspection purposes will be done via LGVs with one or two visits per day.

Once operational the BMEP Site will generate a small number of trips periodically (approximately 6 trips per year), with the impacts also forecast to be imperceptible.

Mitigation and Monitoring Measures

Due to the very low volumes of traffic forecast to be generated during this stage no mitigation measures are required.

Residual Effects

No residual effects.

Significance of Effects

Based on the assessment above, the effects on traffic will be Not Significant.

5.4.3.2.6 *Major Accidents and Natural Disasters*

Pre-Mitigation Effects

A risk register has been developed which contains all potentially relevant risks identified during the operational phase of the Prospective Development. Seven risks (Severe Weather, Flooding, Peat Stability, Traffic Incident, Contamination, Fire/ Explosion and Collapse/Damage to Structures) specific to the operational phase have been identified and are presented in Chapter 16 Major Accidents and Natural Disasters. As outlined in Section 16.4.1, the scenarios with the highest risk score in terms of the occurrence of major accident and/or disaster during operation were identified as 'Traffic Incident' and 'Fire/Explosion' during operation.

Mitigation and Monitoring Measures

- The Prospective Development has been designed and built in line with current best practice and, as such, mitigation against the risk of major accidents and/or disasters will be embedded through the design. In accordance with the provision of the European Commission '*Guidance on the preparation of Environmental Impact Assessment Reports'* 2017, a Risk Management Plan will be prepared and implemented on site to ensure an effective response to disasters or the risk of accidents. The plan will include sufficient preparedness and emergency planning measures.
- The Prospective Development will also be subject to a fire safety risk assessment in accordance with Chapter 19 of the Safety, Health and Welfare at Work Acts 2005 to 2014, which will assist in the identification of any major risks of fire on site, and mitigation of the same during operation.

Please refer to Chapter 18 Schedule of Mitigation and Monitoring Measures which details all proposed mitigation and monitoring measures for the construction, operation and decommissioning of the Prospective Development.

Residual Effects

Based on the assessment contained in Chapter 16, it is concluded that the risk of a major accident and/or disaster during the operational phase of the Prospective Development is considered 'low' in accordance with the '*Guide to Risk Assessment in Major Emergency Management'* (DoEHLG, 2010).

Significance of Effects

Based on the above and the risk assessment in Chapter 16, the effects to/from Major Accidents and Natural Disasters during the operational phase of the Prospective Development are Not Significant.

5.4.3.2.7 *Shadow Flicker*

Pre-Mitigation Effect

As stated in Section 5.3.8, 4 no. properties have been modelled for the shadow flicker assessment. Assuming theoretical precautionary conditions (i.e., 100% sunshine on all days where the shadow of the turbines passes over a house, wind blowing in the correct direction, no screening present, etc.), it is predicted that 4 no. properties may experience daily shadow flicker occurrences in excess of the Guidelines (DoEHLG, 2006) threshold of 30 minutes per day as a result of the Wind Farm Site. As mentioned in Section 5.2.3.5 above, of the 4 no. properties, 3 no. are participating properties, and 1 no. is in derelict condition thus will not require daily and/or annual mitigation measures. The Guidelines (DoEHLG, 2006) total annual limit of 30 hours is predicted to be exceeded at 1 no. sensitive receptors which is a participating property, when the regional sunshine average of 29.79% as detailed in Table 5-3 is taken into account. This will result in a potential long-term slight negative impact on sensitive receptors. Proposed Mitigation Measures

As the dwellings which shadow flicker has been predicted to exceed the Guidelines (DoEHLG, 2006) limits are participating properties or derelict and mitigation measures are not required, the below section outlines the mitigation measures which can be employed on the Wind Farm Site if necessary. Where daily or annual shadow flicker exceedances are predicted at any inhabitable third-party dwelling, a site visit will be undertaken firstly to determine the presence of existing screening and window orientation at each potentially affected property. This will determine if the receptor has an actual line of sight to any turbine and actual potential for shadow flicker to occur. Once this exercise is completed and all of the potentially affected properties, the following measures will be employed.

Screening Measures

In the event of an occurrence of shadow flicker exceeding guideline threshold values of 30 minutes per day at residential receptor locations, mitigation options will be discussed with the affected homeowner, including:

- Installation of appropriate window blinds in the affected rooms of the residence;
- Planting of screening vegetation;
- Other site-specific measures which might be agreeable to the affected party and may lead to the desired mitigation.

If agreement can be reached with the homeowner, then it would be arranged for the required mitigation to be implemented in cooperation with the affected party as soon as practically possible and for the full costs to be borne by the wind farm operator.

Wind Turbine Control Measures

If it is not possible to mitigate any identified shadow flicker limit exceedance locally using the measures detailed above, wind turbine control measures will be implemented.

Wind turbines can be fitted with shadow flicker control units to allow the turbines to be controlled to prevent the occurrence of shadow flicker at properties surrounding the wind farm. The shadow flicker control units will be added to any required turbines.

A shadow flicker control unit allows a wind turbine to be programmed and controlled using the wind farm's Supervisory Control and Data Acquisition (SCADA) system to change a particular turbine's operating mode during certain conditions or times or even turn the turbine off if necessary.

All predicted incidents of shadow flicker can be pre-programmed into the wind farm's control software. The wind farm's SCADA control system can be programmed to shut down any particular turbine at any particular time on any given day to avoid excessive shadow flicker occurrences at properties which are not naturally screened or cannot be screened with measures outlined above. Where such wind turbine control measures are to be utilised, they need only be implemented when the specific combined circumstances occur that are necessary to give rise to the shadow flicker effect in the first instance. Therefore, if the sun is not shining on a particular day that shadow flicker was predicted to occur at a nearby property, there would be no need to shut down the relevant turbines that would have given rise to the shadow flicker at the property. Similarly, if the wind speed was below the cut-in speed that caused the turbine rotor to rotate and give rise to a shadow flicker effect at a nearby property, there would be no need to shut down the relevant turbines that otherwise would have caused shadow flicker.

The atmospheric variables that determine whether shadow flicker will occur or not, are continuously monitored at the Proposed Wind Farm and the data fed into the wind farm's SCADA control system. The strength of direct sunlight is measured by way of photocells, and if the sunlight is of sufficient strength to cast a shadow, the shadow flicker control mechanisms come into effect. Wind speed and direction are measured by anemometers and wind vanes on each turbine and on the wind farm's met mast, and similarly, and if wind speed and direction is such that a shadow will be cast, the shadow flicker control mechanisms come into effect. The moving blades of the turbine will require a short period of time to cease rotating and as such there may be a very short period (less than 3 to 5 minutes) during which the blades are slowed to a complete halt. The turbines giving rise to shadow flicker may be turned off on different days to prevent excessive wear and tear on any single turbine.

In order to ensure that the model and SCADA system is accurate and working well a site visit will be carried out to verify the system. The shadow flicker prediction data will be used to select dates on which a shadow flicker event could be observed at one or multiple affected properties and the following process will be adhered to.

1. *Recording the weather conditions at the time of the site visit, including wind speeds and direction (i.e. blue sky, intermittent clouds, overcast, moderate breeze, light breeze, still etc.).*
2. *Recording the house number, time and duration of site visit and the observation point GPS coordinates.*
3. *Recording the nature of the sensitive receptor, its orientation, windows, landscaping in the vicinity, any elements of the built environment in the vicinity, vegetation.*
4. *In the event of shadow flicker being noted as occurring the details of the duration (times) of the occurrence will be recorded.*
5. *The data will then be sent to the wind farm operational team to confirm that the model and SCADA system are working.*
6. *Following 12 months of full operation of the Prospective Development a report can be prepared for the Local Authority describing the shadow flicker mitigation measures used at the wind farm and confirming the implementation and successful operation of the system.*

This method of shadow flicker mitigation has been technically well-proven at wind farms in Ireland and also in areas outside Ireland that experience significantly longer periods of direct sunlight. In order to demonstrate how the SCADA control system can be applied to switch off particular turbines at the relevant times and dates, In this case, the relevant turbine(s) would be programmed to switch off for the time required to reduce daily shadow flicker to below the guideline limit of 30 minutes. The SCADA

control system would be utilised to control shadow flicker in the absence of being able to agree alternative mitigation measures with the relevant property owner.

Where a shadow flicker mitigation strategy is to be implemented, it is likely that the control mechanisms would only have to be applied to a turbine to bring the duration of shadow flicker down to the 28-minute post-mitigation shadow flicker target.

Overall, the details presented above demonstrate that using the turbine control system, it will be possible to reduce the level of shadow flicker at any affected property to below the daily guideline limit of 30 minutes, by programming the relevant turbines to switch off at the required dates and times.

Notwithstanding this, the approach set out above should shadow flicker associated with the Wind Farm Site be perceived to cause nuisance at any home, the affected homeowner is invited to engage with the Wind Farm operator. Should a complaint or query in relation to shadow flicker be received within 12 months of commissioning of the Wind Farm Site, field investigation/monitoring will be carried out by the wind farm operator at the affected property. The homeowner will be asked to log the date, time and duration of shadow flicker events occurring on at least five different days. The provided log will be compared with the predicted occurrence of shadow flicker at the residence, and if necessary, a field investigation will be carried out. Likewise, the Prospective Development can be brought in line with the requirements of the Draft Guidelines (DoHPLG, 2019) should they be adopted during the planning application process for this development.

Residual Effect

With the benefit of the mitigation measures outlined in this section (if required), any turbine to be installed onsite will be able to comply with the Guidelines (DoEHLG, 2006) (or Draft Guidelines (DoHPLG 2019) if required).

Based on the above, there will be no residual effect on human health from shadow flicker.

Significance of Effects

Based on the assessment above and the mitigation measures proposed the effects related to shadow flicker will be Not Significant.

5.4.3.2.8 *Renewable Energy Production and Reduction in Greenhouse Gas Emissions*

Pre-Mitigation Effect

As detailed in Section 11.2.2 of Chapter 11 Climate, the EPA reported a provisional total of national greenhouse gas emissions for 2024 (excluding LULUF) to be 53.8 million tonnes carbon dioxide equivalent ($MtCO_2eq$); with greenhouse gas emissions from overall electricity generation in Ireland decreasing by 8.9% while electricity demand increased by 4.2% due to increased renewable electricity generation increasing 1.3%%.[59] The increase in renewables, combined with decreases in coal, oil, and peat use, resulted in the emissions intensity of power generation in Ireland in 2022 decreasing by 11.0%; i.e., an historic low of $226gCO_2/kWh$ in 2024 as compared with $254gCO_2/kWh$ in 2023. In 2024 the energy industry, transport and agriculture sectors accounted for 74.1% of total greenhouse gas emissions. Agriculture was the single largest contributor to overall emissions, being responsible for 38% of emissions. Transport and the energy industry accounted for 27.7% and 13.3% of total Irish emissions

[59] *Ireland's Provisional Greenhouse Gas Emissions 1990-2024 (July 2025). Available at: https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/EPA-Provisional-1990-2024-GHG-Report-1716.pdf*

respectively. The EPA report highlights that whilst emissions are beginning to reduce, transformative measures will be needed to meet National Climate ambitions.

Ireland will therefore have to meet even more demanding climate change and renewable energy supply obligations in order to play its part in achieving the European climate and energy ambitions. As announced in April 2025, the Irish Government have pledged to generate 80% of the country's electricity supply from renewable sources by 2030.[60]

Mitigation and Monitoring Measures

No mitigation required.

Residual Effect

The development of additional indigenous wind energy generating capacity, such as that proposed from the Prospective Development, will help to reduce carbon emissions and improve Ireland's security of energy supply.

The Prospective Development will offer significant benefits in terms of renewable energy production and reductions in greenhouse gas emissions and other air pollutants. In this regard, it will have a long-term moderate positive residual effect. The carbon loss and savings due to the Prospective Development are discussed in Section 11.4.3.2 of Chapter 11 of this EIAR.

Significance of Effects

Based on the assessment above the effects related to renewable energy production and reduction in greenhouse gases will be Not Significant.

5.4.3.2.9 *Interference with Communications Systems and EMF*

Pre-Mitigation Impacts

Wind turbines, like all large structures, have the potential to interfere with broadcast signals, by acting as a physical barrier or causing a degree of scattering to microwave links. The alternating current, electrical generating and transformer equipment associated with wind turbines, like all electrical equipment, also generates its own electromagnetic fields, and this can interfere with broadcast communications.

EMF is often colloquially considered to have a negative effect on human health. However, as stated in Section 5.3.4.4 above, the EMF and ELF of electricity cables are in compliance with EU guidelines for the exposure of EMF to humans. As such, there is no potential for negative health effects on the local population due to EMF or ELF produced by any of the proposed infrastructure.

EMF along the Grid Connection Site is detailed in Section 15.2.3.4.1 in Chapter 15 Material Assets. The ESB 2017 document '*EMF & You: Information about Electric & Magnetic Fields and the electricity network in Ireland*', ' states that EMF from 110kV overhead lines and underground cables diminishes quickly with distance from the potential impacted receptor, with EMF from underground 110kV cables, diminishing from 4µT to 0.5µT at 10m away from the cable, reducing to almost 0µT at 20m.

[60] *Department of the Environment, Climate and Communications (2025) Climate Action Plan 2025* <https://assets.gov.ie/static/documents/Climate_Action_Plan_2025_updated_cover.pdf>

Mitigation and Monitoring Measures

The most significant effect at a domestic level relates to a possible flicker effect caused by the moving rotor, affecting, for example, radio signals. The most significant potential effect occurs where the wind farm is directly in line with the transmitter radio path. This interference can be overcome by the installation of deflectors or repeaters.

Residual Effects

Potential impacts on broadcast signals are discussed in detail in Section 15.2 of Chapter 15 Material Assets of this EIAR. The Prospective Development will have no residual effect on the telecommunications signals of any operator, due to distance from or absence of any links in the area.

Significance of Effects

Based on the assessment above, the effects on interference with communications systems and EMF from the Prospective Development during the operational phase will be Not Significant.

5.4.3.2.10 *Summary of Significance of Effects*

Section 5.4.3.2 above assess the potential likely significant effects on health during the operational phase of the Prospective Development. Based on the assessment of the relevant topics above, the operational phase of the Prospective Development will not result in any significant effects on health. The overall effect on health as a result of the operational phase of the Prospective Development is Not Significant.

5.4.4 Decommissioning Phase

The wind turbines proposed as part of the Prospective Development are expected to operate for a period of 25 years. Following the end of this period, the wind turbines may either operate for a further period or be replaced with a new set of turbines, subject to planning permission being obtained, or the Subject Development may be decommissioned fully. The Grid Connection infrastructure will remain in place as it will form part of the national electricity grid under the control of EirGrid.

The works required during the decommissioning phase are described in Section 4.12 in Chapter 4: Description of the Prospective Development. Any effect and consequential effect that occurs during the decommissioning phase will be similar to that which occurs during the construction phase, however to a lesser extent, and the mitigation measures outlined above will be implemented during the decommissioning phase also. A Decommissioning Plan has been prepared as part of this EIAR and is included as Appendix 4-6. This Decommissioning Plan follows the most up to date NatureScot guidance. By its nature, the Decommissioning Plan is a working document and, in accordance with the NatureScot guidance, an updated decommissioning plan will be agreed with the local authorities three months prior to decommissioning the Subject Development. The principles that will inform the final decommissioning plan are contained in the Decommissioning Plan in Appendix 4-6.

5.5 Cumulative Effects – Prospective Development

For the assessment of cumulative effects of the Prospective Development, any other existing, permitted or proposed projects (wind energy or otherwise) have been considered. The potential cumulative effects of the Prospective Development and other relevant developments has been carried out with the purpose of identifying what influence the Prospective Development will have on the surrounding environment when considered cumulatively. Further information on projects considered as part of the cumulative assessment are given in Section 2.10 of Chapter 2 Background and Policy. The cumulative effects assessment of the Prospective Development has considered the list of plans and projects listed in Appendix 2-1 of this EIAR. The impacts with the potential to have cumulative impacts on population

and human health, in particular noise, air quality, climate, shadow flicker, traffic, telecommunications, and visual impacts are addressed in their relevant chapters of this EIAR.

5.5.1 Population Levels

The Prospective Development alongside other proposed, planned or permitted projects will have no cumulative impact on the population of the area in terms of changes to population trends or density, household size or age structure.

5.5.2 Employment and Investment

Cumulative projects within 20 kilometres of the Prospective Development which may be proposed, permitted or operational/existing contribute to short term employment during the construction stages and provide the potential for long-term employment resulting from maintenance operations. This results in a long-term slight positive effect.

The rate payments from the Subject Development and other projects in the area will contribute significant funds to Donegal County Council, which will be redirected to the provision of public services within the County.

In addition, the injection of money into local services though the establishment of community benefit funds is also expected to be a long-term positive cumulative effect.

5.5.3 Land Use Patterns

The provision of habitat enhancement as part of the Prospective Development, alongside other plans and projects with incorporated biodiversity enhancement schemes will result in a long-term slight positive cumulative effect on land use patterns and activities.

5.5.4 Tourism

There are no key identified tourist attractions pertaining specifically to the Site.

It is not considered that the Prospective Development together with other projects in the area will cumulatively affect any tourism infrastructure in the wider area. Wind farms are an existing feature in the surrounding landscape, which will assist in the assimilation of the Wind Farm Site into this environment. As also noted in Section 5.4.2.1.5 above, the conclusions from available research indicate there is a generally positive disposition among tourists towards wind development in Ireland.

It is on this basis that it can be concluded that there would be a long-term imperceptible cumulative effect from the Prospective Development and other wind farm developments in the area.

5.5.5 Property Values

As noted in Section 5.4.3.1.4 above, it can be concluded that there is the potential for a short-term negative not significant effect on property values within 1km of the proposed turbines of the Wind Farm Site. There are no other cumulative turbines located within 2km of the proposed turbines and so this area within 1km, where there is potential for impacts on property values, will not overlap with any other cumulative turbines. On that basis it is concluded that there is no potential for cumulative effects on property values to arise from the Prospective Development.

5.5.6 Residential Amenity

Pre-Mitigation Effects

In the extremely unlikely event that all permitted and proposed projects as described in the cumulative assessment in Chapter 2 of this EIAR are constructed at the same time, there is the potential for a resulting short term, moderate, cumulative, negative effects to occur on residential amenity, in relation to noise and vibration, dust, traffic, telecommunications and visual amenity.

Proposed Mitigation Measures

All mitigation as outlined under noise and vibration, dust, traffic, visual amenity and telecommunications in this EIAR will be implemented in order to reduce insofar as possible effects on residential amenity at properties located in the vicinity of the Prospective Development works, including along the proposed turbine and construction materials haul route. It is assumed also that all mitigation measures in relation to the other cumulative projects will also be implemented.

Residual Effects

The Subject Development will have a short-term, slight negative residual effect on residential amenity during construction works. During the operational phase, noise and shadow flicker from the proposed and permitted projects will be limited to below Guideline (DoEHLG, 2006) levels, resulting in a long-term, not significant residual impact from on residential amenity.

Significance of Effects

Based on the assessment above there will be no significant direct or indirect effects from the Prospective Development.

5.5.7 Health and Safety

The Prospective Development will have no effects in terms of health and safety. There is no credible scientific evidence to link wind turbines with adverse health effects. All other existing, permitted or proposed projects (wind energy or otherwise) would be expected to follow all relevant Health and Safety Legislation during the construction, operation and decommissioning phases of the development. It is assumed also that all mitigation measures in relation to the other cumulative projects will also be implemented.

It is on this basis that it can be concluded that there would be a long-term imperceptible cumulative effect from the Prospective Development and other developments in the area.

5.5.8 Air Quality: Dust and Exhaust Emissions Dust)

The nature of the Prospective Development is such that, once operational, it will have a long-term, moderate, positive effect on the air quality.

During the construction phase of the Prospective Development and the construction phase of other developments within 20 kilometres of the wind farm site that are yet to be constructed, there will be minor emissions from construction plant and machinery and potential dust emissions associated with the construction activities. However, once the mitigation proposals, as outlined in Section 10.3.2.1 to Section 10.3.2.4 of Chapter 10 Air Quality are implemented during the construction phase of the Prospective Development, there will be no significant cumulative negative effect on air quality.

The nature of the Prospective Development and other wind energy developments within 20 kilometres are such that, once operational, they will have a cumulative long-term, moderate, positive effect on the air quality and climate.

5.5.9 Water Quality

The main likelihood of cumulative effects from the Prospective Development is during the construction phase, related to the hydrological environment (surface water). The Prospective Development would have the potential to interact with these agricultural activities and contribute to a deterioration of downstream surface water quality, however, the mitigation measures detailed in Section 9.5.2, 9.5.3 and 9.5.4 for the construction, operation and decommissioning phases of the Prospective Development will ensure the protection of downstream surface water quality. It is considered that there will not be a significant cumulative effect associated with the Prospective Development on water quality.

5.5.10 Noise and Vibration

Existing, permitted and proposed wind farm developments with the potential for cumulative impacts have been considered as part of the turbine noise impact assessment in Chapter 12 of this EIAR. As outlined in Section 12.4.4.4, the the cumulative turbine noise from the Barnesmore Repowering Wind Farm, Meenakeeran Wind Farm and the Straness Wind Farm have been included in the operational turbine noise assessment. No other wind farms have the potential to contribute to cumulative noise levels. The residual cumulative impacts are considered Not Significant

5.5.11 Traffic and Transport

Construction of the Prospective Development at the same time as cumulative projects located in the surrounding area has the potential to give rise to cumulative impacts on traffic. There is 1 no. proposed wind farm development and 1 no permitted wind farm development within 5km of the Prospective Development site. The proposed Meenkeeran Wind Farm is located approximately 3.5km east of the Wind Farm Site, consisting of 5 no. turbines with a maximum tip height of 150m. The permitted Barnesmore Windfarm Repowering is located approximately 4km southwest of the Prospective Development and consists of the decommissioning of 25 no 61m tip height turbines and repowering of the site with up to 13 no. turbines of a maximum tip height of 180m.

The mitigation measures in relation to traffic set out in Section 5.4.2.2.5 above will ensure that any cumulative effects that arise will be temporary in duration and imperceptible in significance.

5.5.12 Major Accidents and Natural Disasters

Following a detailed assessment in Chapter 16 Major Accidents and Natural Disasters of this EIAR, the Prospective Development, with mitigation measures in place, was found to have no potential for significant cumulative effects associated with the potential for the project to be impacted by major accidents and/ or natural disasters or the Prospective Development potential to cause major accidents and/ or natural disasters. This is based on the low risk associated with the Prospective Development described in Chapter 16 of this EIAR and a review of the nature of the surrounding land uses and projects existing or intended in the surrounding area. Therefore, the cumulative residual effect of the Prospective Development to cause or be impacted by major accidents and natural disasters is not significant.

5.5.13 Shadow Flicker

As outlined above, no dwellings will be impacted by shadow flicker from the Prospective Development in combination with other existing, permitted, or proposed wind farms and therefore no potential for a cumulative effect.

5.6 In-Cumulation Effects

This section considers the in-cumulation impact of the combination of the Existing Development and Prospective Development (the Subject Development). Table 5-14 below details the residual in-cumulation effects of the Subject Development. Renewable Energy Production, Interference with Communications and EMF are not considered n this table as they only arise as part of the Prospective Development and there is therefore no potential for a In-Cumulation Effect.

Table 5-14 Assessment of potential In-Cumulation Effects of the Subject Development

Topic		Prospective Development	Existing Development	Subject Development
Population	Population Levels	The Existing Development did not result in any changes to population trends, density, household size, or age structure within the local area. There was no effect on population levels, no mitigation required and therefore no residual effects The effects on population levels from the Existing Development are considered to be Not Significant.	The Prospective Development will have no impact on the population of the area with regard to changes to trends, population density, household size or age structure. There is no potential for effect on population levels, no mitigation required and therefore no residual effects. The effects on population levels from the Prospective Development are considered to be Not Significant.	The effects on population levels from both the Prospective Development and Existing Development are considered to be Not Significant. There is no temporal overlap between the Prospective Development and the Existing Development and therefore no potential for an In- Cumulation effect. Based on the above, the potential for effects arising from the Subject Development is the same as that arising from the Prospective Development. Therefore, the effects on population levels from the Subject Development are Not Significant.
	Employment and Investment	The construction of the Existing Development had a Short-term, Slight, Positive, Indirect, Effect on employment and investment. The injection of money in the form of salaries and wages to those employed during the construction phase of the Existing Development resulted in	The injection of money in the form of salaries and wages to those employed during the construction phase, and the Community Gain income and landowner payments of that will result from the Prospective Development has the potential to result in an increase in	The effects on Employment and Investment from both the Prospective Development and Existing Development are considered to be Not Significant. There is potential for an in cumulation effect on employment and investment arising from the Subject Development.

		an increase in household spending and demand for goods and services in the local area. This resulted in local retailers and businesses experiencing a Short-term Positive effect on their cash flow. This had a Short-term, Slight, Positive, Indirect Effect. The effects on Employment and Investment from the Existing Development are considered to be Not Significant	household spending and demand for goods and services in the local area will result in a slight long-term positive effect. The effects on Employment and Investment from the Prospective Development are considered to be Not Significant	Based on the above, the potential for effects arising from the Subject Development is an In-cumulation effect of both the Existing and the Prospective Development. Therefore, effects on Employment and Investment from the Subject Development are slight, long term, positive and is considered to be Not Significant.
	Land Use Patterns and Activities	Arising from the Existing Development there was a residual effect that was permanent, imperceptible and negative. The effect on land use/activities due to the Existing Development infrastructure was Not Significant.	During the construction phase there is a residual effect that is permanent, not significant and negative. During the operational phase there is also a residual effect that is permanent, not significant and negative. The effect on land use/activities due to the Prospective Development infrastructure is Not Significant.	The effect on land use/activities due to both the Prospective Development and Existing Development infrastructure is Not Significant. There is potential for an In-Cumulation effect on Land Use Patterns and Activities from the combination of the Existing and Prospective Developments. The most significant residual effect arises from the In-Cumulation effect of the Existing Development and the Construction Phase of the Prospective Development. On this basis the residual effect of the Subject Development on the Land Use Patterns and Activities is permanent, not significant and negative. The effect of the Subject Development on Land Use Patterns and Activities is Not Significant.
	Property Values	The residual effect of the Existing Development on Property Values are short-term, imperceptible and negative.	During the construction phase there is the potential for a residual effect on	The effect on property values due to both the Prospective Development and Existing Development is Not Significant.

		The effect on property values due to the construction of the Existing Development was Not Significant.	property values that is short term, imperceptible and negative. There is the potential for a long-term negative imperceptible residual effect on property values from the Prospective Development during the operational phase. The effect on property values due to the Prospective Development is Not Significant.	There is potential for an In-Cumulation effect on Property Values from the combination of the Existing and Prospective Developments. Based on the residual effects arising from both the Existing and Prospective Developments, the Subject Development residual effect is considered to be long term, imperceptible and negative. The effect on property values due to the Subject Development is Not Significant.
	Tourism	The assessment concluded that there were no residual effects on tourism in the wider landscape due to the Existing Development. The effect on tourism in the wider landscape during the construction of the Existing Development is considered Not Significant.	It is considered that the Prospective Development will have no residual effects on visitor experiences to attractions in the wider landscape during both the construction phase and operational phase. The effect on tourism in the wider landscape due to the Prospective Development will be Not Significant.	The effect on tourism in the wider landscape due to both the Prospective Development and the Existing Development will be Not Significant. There is potential for an In-Cumulation effect on Tourism from the combination of the Existing and Prospective Developments. Both the Existing Development and the Prospective Development have no residual effects. On that basis the Subject development will have no residual effects on Tourism. The Subject Development effect on Tourism is Not Significant.
	Residential Amenity	Residential amenity was subject only to Temporary, Slight, Negative Effects during construction of the Existing Development.	Based on the assessment in Section 5.4, it is concluded that air, traffic, noise and vibrations emissions and shadow flicker will result in a short term, slight,	The effect on residential amenity as a result of both the Prospective Development or the Existing Development is Not Significant.

		The effect on residential amenity as a result of the Existing Development is Not Significant.	negative residual effect during the construction phase and a long-term, slight, negative residual effect on residential amenity during the operational phase due to the Prospective Development. The effect on residential amenity as a result of the Prospective Development is Not Significant.	There is potential for an In-Cumulation effect on Residential Amenity from the combination of the Existing and Prospective Developments. Based on the residual effect arising from both the Existing Development and the Prospective Development , the residual effect of the Subject Development is long term, slight and negative. The Subject Development effect on Residential Amenity is Not Significant.
Human Health	Health and Safety	There was no residual effect on Health and Safety as a result of the Existing Development.	There is a short term, slight negative residual effect during the construction phase and a long-term potential, imperceptible negative residual effect during the operational phase on Health and Safety due to the Prospective Development. The effect of the Prospective Development on Health and Safety is considered to be Not Significant.	Effects on Health and Safety due to both the Prospective Development and the Existing Development are considered to be Not Significant. There is no temporal overlap between the Prospective Development and the Existing Development and therefore no potential for an In-Cumulation effect. The potential for a residual effect on Health and Safety from the Subject Development is the same as the potential effect from the Prospective Development. Therefore, based on the residual effect arising during both the construction and operational phases, the residual effect of the Subject Development on Health and Safety is long term , imperceptible and negative. The effect of the Subject Development on Health and Safety is considered to be Not Significant.

	Air Quality: Dust and Exhaust Emissions	The residual impacts on air quality from exhaust emissions and dust associated with construction activities and machinery are considered to have been Temporary, Imperceptible, Local and Negative. There was No Significant Effect on Air Quality as a result of the construction of the Existing Development	The residual effects during the construction phase on air quality from dust and exhaust emissions associated with construction activities and machinery are considered to have a short-term slight negative effect on air quality. Overall, considering offsetting of dust and greenhouse gas emissions from fossil fuels during the operational phase, there will be a long-term overall moderate positive effect on air quality. Effects on Air Quality due to the Prospective Development are considered to be Not Significant.	The effects on Air Quality from both the Prospective Development and the Existing Development will be Not Significant. There is no temporal overlap between emissions arising during the Prospective Development and the Existing Development and therefore no potential for an In-Cumulation effect. As there is no In-Cumulation effect the residual effects arising from the Subject Development are considered to the same as the residual effects of the Prospective development, namely, long term moderate and positive. Effects on Air Quality due to the Subject Development are considered to be Not Significant.
	Water Quality	The residual effect on human health resulting from water quality changes during the construction phase, including those associated with the November 2020 Peat Slide, is assessed as indirect, temporary, slight and negative.. Mitigation measures as listed in rEIAR ensured the protection of the public water supply and prevented any adverse health outcomes. The effects on water quality from the Existing Development were Not Significant.	The residual effects on human health due to water quality are considered to be short term, imperceptible and negative, during the construction phase and temporary, imperceptible and negative during the operational phase. The effects on water quality from the Prospective Development will be Not Significant.	The effects on water quality from both the Prospective Development and the Existing Development will be Not Significant. As the residual effects that arose during the Existing Development were temporary, there is no potential for an In–Cumulation effect arising from the combination of the Existing and Prospective Developments. On that basis the residual effect of the Subject Development is the same as the residual effect of the Prospective Development, namely short term, imperceptible and negative.

				Effects on Water Quality due to the Subject Development are considered to be Not Significant..
	Noise and Vibration	With the implementation of the mitigation measures provide in Chapter 18 of the rEIAR, there was a temporary, imperceptible negative effect on health from the Existing Development. The effects on Human Health from Noise and Vibration from the Existing Development were Not Significant.	There will be a residual slight, short-term, negative effect on health due to an increase in noise levels during the construction phase of the Prospective Development. There will be a residual not significant, long term, negative effect on health due to an increase in noise levels during the operational phase of the Prospective Development. The effects on human health due to noise emissions from the Prospective Development will be Not Significant.	The effects on human health due to noise emissions from both the Prospective Development and the Existing Development will be Not Significant. As the residual effects that arose during the Existing Development were temporary, there is no potential for an In–Cumulation effect arising from the combination of the Existing and Prospective Developments. On that basis the residual effect of the Subject Development is the same as the residual effect of the Prospective Development, namely long term, not significant and negative. The effects on human health due to noise emissions from the Subject Development will be Not Significant.
	Traffic and Transport	There was a residual, short term slight negative effect on health due to the elevated traffic levels arising from the Existing Development. The effects on traffic from the Existing Development are considered to have been Not Significant.	During the construction phase there will be a short term, slight, negative effect on local road users. During the operational phase there will be a long term, imperceptible, negative effect on local road users. The effects on traffic from the Prospective Development are considered to be Not Significant.	The effects on traffic from both the Prospective Development and the Existing Development will be Not Significant. There is no temporal overlap between traffic levels arising during the Prospective Development and the Existing Development and therefore no potential for an In-Cumulation effect. On that basis the residual effect of the Subject Development is the same as the residual effect of the

				Prospective Development, namely long term, imperceptible and negative. The effects on traffic from the Subject Development are considered to be Not Significant.
	Major Accidents and Natural Disasters	With the implementation of the emergency response plan and other mitigation measures discussed in Chapter 18 of the rEIAR there were no residual effect on Human Health as a result of Major Accidents and Natural Disasters. The November 2020 Peat Slide did not have any residual effect on 'People', 'Essential Services', or 'Social' risk categories, as detailed in Chapter 16 of the rEIAR. The effects to/from Major Accidents and Natural Disasters from the Existing Development were Not Significant.	The impact assessment concludes that the risk of a major accident and/or disaster during the construction phase of the Prospective Development is considered 'low' in accordance with the 'Guide to Risk Assessment in Major Emergency Management' (DoEHLG, 2010). It is considered that there will be no significant residual effect(s) associated with both the construction and operation of the Prospective Development. The effects to/from Major Accidents and Natural Disasters from the Prospective Development are Not Significant.	The effects on Human Health due to Major Accidents and Disasters arising from both the Prospective Development and the Existing Development will be Not Significant. There were no residual effects on human health from the Existing Development and therefore no potential of an In-Cumulation effect between the Existing Development and the Subject Development. On that basis the residual effect of the Subject Development is the same as the potential residual effect of the Prospective Development, and there is therefore no potential residual effect. The effects to/from Major Accidents and Natural Disasters arising from the Subject Development are Not Significant.
	Shadow Flicker	Shadow flicker, as described in Section 5.2.3 and Section 5.4.2.2.7 above, can only occur during the operational phase of a wind energy development. There is no potential for residual Shadow Flicker Effects from the Existing Development. This is considered Not Significant	There will be no residual effect on human health from Shadow Flicker. The effects related to shadow flicker from the Prospective Development will be Not Significant.	The effects on human health due to Shadow Flicker from both the Prospective Development and the Existing Development will be Not Significant. There is no temporal overlap between the Prospective Development and the Existing Development and also no potential for shadow flicker from the existing

				Development so therefore no potential for an In-Cumulation effect. The potential for a residual effect from Shadow Flicker arising from the Subject Development is the same as the potential effect from the Prospective Development. Therefore, based on the residual effect arising during both the construction and operational phases, the residual effect of the Subject Development on Health and Safety is long term, imperceptible and negative. The effects related to shadow flicker from the Subject Development will be Not Significant.

5.7 Cumulative Effects – Subject Development

For the assessment of cumulative effects of the Subject Development, any other existing, permitted or proposed projects (wind energy or otherwise) have been considered. The potential cumulative effects of the Subject Development and other relevant developments has been carried out with the purpose of identifying what influence the Subject Development will have on the surrounding environment when considered cumulatively.

Further information on projects considered as part of the cumulative assessment are given in Section 2.10 of Chapter 2 Background and Policy of this EIAR and section 2.9 of Chapter 2 Background and Policy of the rEIAR. The cumulative effects assessment of the Subject Development has considered the list of plans and projects listed in Appendix 2-1 of this EIAR, and Appendix 2-1 of the rEIAR. The impacts with the potential to have cumulative impacts on population and human health, in particular noise, air quality, climate, shadow flicker, traffic, telecommunications, and visual impacts are further addressed in their relevant chapters of this EIAR and the rEIAR.

A cumulative effects assessment on Population and Health has been carried out for both the Prospective Development in this EIAR and the Existing Development in the rEIAR. Each of the relevant topics are assessed in Table 5-15 below. In summary the assessment concludes that there is no potential for significant cumulative effects arising from the Subject Development combined with other plans and projects.

Table 5-15 Assessment of potential Cumulative Effects of the Subject Development

Topic		Subject Development
Population	Population Levels	There are no residual effects arising from the Prospective Development and the Existing Development and therefore no potential for any cumulative effects for the Subject Development. The potential for Cumulative effects on Population Levels from the Subject Development and other projects is Not Significant.
	Employment and Economic Activity	There is potential for cumulative effects between the Subject Development and other projects within the area that have occurred or will occur. The potential cumulative effects would be long term, slight and positive. However, the potential for Cumulative effects on Employment and Economic Activity from the Subject Development and other projects is Not Significant
	Land Use Patterns and Activities	There is potential for cumulative effects on land-use patterns and activities arising from the Subject Development. Other projects (such as existing, permitted or proposed windfarms) in the area that have occurred or will occur have the potential to affect the Land Use Patterns and Activities. It is considered that the residual cumulative effect would be long term, not significant and negative. However, The potential for Cumulative effects on Land Use Patterns and Activities from the Subject Development and other projects are Not Significant.
	Property Values	The potential for cumulative effects on properties for the Prospective Development is the same as the potential for cumulative effects for the Subject Development, therefore the no potential for significant cumulative effects from the Subject Development. The potential Cumulative effects on Property Values from the Subject Development and other projects are Not Significant.
	Tourism	There are no residual effects arising from the Prospective Development and the Existing Development and therefore no potential for any cumulative effects for the Subject Development The potential Cumulative effects on Tourism from the Subject Development and other projects are Not Significant.

	Residential Amenity	There are potential Cumulative effects that could arise between the Subject Development and other projects. It is considered that the residual cumulative effects are long term, not significant and negative. However, the potential cumulative effects on Residential Amenity from the Subject Development and other projects are Not Significant.
Human Health	Health and Safety	In this case, any potential for a cumulative effect would be between the Prospective Development and other future projects. All other existing, permitted or proposed projects (wind energy or otherwise) would be expected to follow all relevant Health and Safety Legislation during the construction, operation and decommissioning phases of the development. It can be concluded that here would be a long-term imperceptible cumulative effect from the Prospective Development and other developments in the area. The potential for Cumulative effects on Health and Safety from the Subject Development and other projects is Not Significant.
	Air Quality: Dust and Exhaust Emissions	There is no temporal overlap between the Prospective Development and the Existing Development and therefore any potential for cumulative effects will only arise between the Prospective Development and other projects. The nature of the Prospective Development and other wind energy developments within 20 kilometres are such that, once operational, they will have a cumulative long-term, moderate, positive effect on the air quality and climate. However, it is considered the potential for Cumulative effects on Air Quality from the Subject Development and other projects is Not Significant.
	Water Quality	The potential cumulative effects on water quality to be considered will arise from the Prospective Development and other projects. The Prospective Development will be completed without generating a significant effect. On that basis there is no potential for cumulative effects with other projects. The potential Cumulative effects on Water Quality from the Subject Development and other projects are Not Significant.
	Noise and Vibration	The potential cumulative effects arising from Noise and Vibration to be considered will arise from the Prospective Development and other projects. As outlined in Section 12.4.4.4, the cumulative turbine noise from the Barnesmore Repowering wind farm and the Streaness Wind Farm have been included in the operational turbine noise assessment. The Prospective Development will be completed and operate without generating a significant effect.

		Therefore, the potential for Cumulative effects arising from Noise and Vibration from the Subject Development and other projects is Not Significant.
	Traffic and Transport	The potential cumulative effects arising from Traffic and Transport to be considered will arise from the Prospective Development and other projects. It is considered that the residual cumulative effect will occur during the construction phase and will be temporary, imperceptible and negative. Therefore, the potential for Cumulative effects arising from Traffic and Transport from the Subject Development and other projects is Not Significant.
	Major Accidents and Disasters	The potential for cumulative effects for the Prospective Development is the same as the potential for cumulative effects for the Subject Development, therefore the no potential for significant cumulative effects from the Subject Development. There is no temporal overlap between the Prospective Development and the Existing Development and therefore no potential for any cumulative effects from the Subject Development. The potential for Cumulative effects on Residential Amenity from the Subject Development is Not Significant.
	Shadow Flicker	The potential for cumulative effects from Shadow Flicker for the Prospective Development is the same as the potential for cumulative effects for the Subject Development, therefore there is no potential for significant cumulative effects from the Subject Development in conjunction with other projects. The potential Cumulative effects from Shadow Flicker arising from the Subject Development and other projects is Not Significant.

5.8 Transboundary Effects

This section considers the potential for transboundary effects as a result of the Subject Development. Table 5-16 below details the residual effects of the Subject Development, and the potential for which the Subject Development could affect a different jurisdiction.

Table 5-16 Assessment of potential Transboundary Effects of the Subject Development

Topic		Prospective Development	Existing Development	Subject Development
Population	Population Levels	No Significant Effect on Population Levels within the Population Study Area, thus there is No potential for Significant Transboundary Effects from the Prospective Development	No Significant Effect on Population Levels within the Population Study Area, thus there is No potential for Significant Transboundary Effects from the Existing Development	No potential for Significant Transboundary Effects from the Subject Development
	Employment and Investment	No Significant Effect on Employment and Investment within the Population Study Area, thus there is No potential for Significant Transboundary Effects from the Prospective Development	No Significant Effect on Employment and Investment within the Population Study Area, thus there is No potential for Significant Transboundary Effects from the Existing Development	No potential for Significant Transboundary Effects from the Subject Development
	Land Use Patterns and Activities	No Significant Effect on Land Use Patterns and Activities within the Population Study Area, thus there is No potential for Significant Transboundary Effects from the Prospective Development	No Significant Effect on Land Use Patterns and Activities within the Population Study Area, thus there is No potential for Significant Transboundary Effects from the Existing Development	No potential for Significant Transboundary Effects from the Subject Development
	Property Values	No Significant Effect on Property Values within the Population Study Area, thus there is No potential for Significant Transboundary Effects from the Prospective Development	No Significant Effect on Property Values within the Population Study Area, thus there is No potential for Significant Transboundary Effects from the Existing Development	No potential for Significant Transboundary Effects from the Subject Development
	Tourism	No Significant Effect on Tourism within the Population Study Area, thus there is	No Significant Effect on Tourism within the Population Study Area,	No potential for Significant Transboundary Effects from the Subject Development

		No potential for Significant Transboundary Effects from the Prospective Development	thus there is No potential for Significant Transboundary Effects from the Existing Development	
	Residential Amenity	No Significant Effect on Residential Amenity within the Population Study Area, thus there is No potential for Significant Transboundary Effects from the Prospective Development	No Significant Effect on Residential Amenity within the Population Study Area, thus there is No potential for Significant Transboundary Effects from the Existing Development	No potential for Significant Transboundary Effects from the Subject Development
Human Health	Health and Safety	Effects on health and safety due to the Prospective Development are considered to be Not Significant. There is No potential for Significant Transboundary Effects from the Prospective Development	No Significant Effect on Residential Amenity within the Population Study Area, thus there is No potential for Significant Transboundary Effects from the Existing Development	No potential for Significant Transboundary Effects from the Subject Development
	Air Quality: Dust and Exhaust Emissions	Effects on human health from Air Quality within the Air Quality Study Area due to the Prospective Development are considered to be Not Significant. There is no potential for Significant Transboundary Effects from the Prospective Development	No Significant Effect on human health from Air Quality within the Air Quality Study Area, thus there is no potential for Significant Transboundary Effects from the Existing Development	No potential for Significant Transboundary Effects from the Subject Development
	Water Quality	The potential for transboundary effects on human health from Water Quality are considered within the Hydrological Study Area for the Prospective Development and will be Not Significant. There is no potential for Significant Transboundary Effects from the Prospective Development	No Significant Effect on human health from Water Quality within the Hydrological Study Area, thus there is no potential for Significant Transboundary Effects from the Existing Development	No potential for Significant Transboundary Effects from the Subject Development

	Noise and Vibration	The potential for transboundary effects on human health from Noise and Vibration are considered within the Noise Study Area for the Prospective Development, which there are no sensitive receptors located in Northern Ireland, and will be Not Significant. There is no potential for Significant Transboundary Effects from the Prospective Development	No Significant Effect on human health from Noise and Vibration within the Noise Study Area, thus there is no potential for Significant Transboundary Effects from the Existing Development	No potential for Significant Transboundary Effects from the Subject Development
	Traffic and Transport	The potential for transboundary effects from Traffic and Transport are considered within the Traffic Study Area for the Prospective Development and will be Not Significant. There is no potential for Significant Transboundary Effects from the Prospective Development	No Significant Effect on Traffic and Transport occurred within the Traffic Study Area, thus there is no potential for Significant Transboundary Effects from the Existing Development	No potential for Significant Transboundary Effects from the Subject Development
	Major Accidents and Natural Disasters	The potential for transboundary effects from Traffic and Transport are considered within the Traffic Study Area for the Prospective Development and will be Not Significant. There is no potential for Significant Transboundary Effects from the Prospective Development	No Significant Effect on Traffic and Transport within the Traffic Study Area, thus there is no potential for Significant Transboundary Effects from the Existing Development	No potential for Significant Transboundary Effects from the Subject Development
	Shadow Flicker	The potential for transboundary effects on human health from Shadow Flicker are considered within the Shadow Flicker Study Area for the Prospective Development, which there are no	Shadow flicker, as described in Section 5.2.3 and Section 5.4.3.2.7 above, can only occur during the operational phase of a wind energy development. There is no potential	No potential for Significant Transboundary Effects from the Subject Development

		sensitive receptors located in Northern Ireland, and will be Not Significant. There is no potential for Significant Transboundary Effects from the Prospective Development	for Transboundary Shadow Flicker Effects from the Existing Development.	

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