Planning and Environmental Consultants

Environmental Impact Assessment Report (EIAR)

Cunlaghfadda Green Energy Project, Co. Mayo

Chapter 5 – Population and Human Health

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 Proposed Project 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 Proposed Project is provided in Chapter 4 of this EIAR.

As detailed in Section 1.1.1 of Chapter 1, for the purposes of this EIAR, the various project components are described and assessed using the following references: 'Proposed Project', 'Proposed Wind Farm', 'Proposed Grid Connection', 'Site'. For the purposes of this chapter, the 'Proposed Turbines' refers to the 7 no. turbines associated with the Proposed Wind Farm.

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 was completed by Keelin Bourke and Joye Atkinson, and reviewed by Natalia Stolarska and Órla Murphy, of MKO.

Keelin Bourke 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.

Joye is a Graduate Environmental Scientist with MKO and holds a BSc (Hons) in Social Science from University College Dublin. Prior to joining MKO, she completed a one-year internship with RMLA Planning, where she contributed to a range of projects across both the public and private sectors. Joye's core strengths include drafting Environmental Impact Assessment Report (EIAR) chapters, as well as strong report writing skills, with the ability to present complex environmental data clearly, concisely, and in line with regulatory requirements. At MKO, Joye's work focuses on report writing, EIAR chapter preparation, and GIS-based mapping. She has contributed to multiple onshore wind projects across Ireland, supporting both technical analysis and environmental assessment.

In her role as a project manager, Natalia Stolarska is a Project Environmental Scientist who has been working with MKO since 2023. Natalia holds a BSc in Earth and Ocean Science and an MSc in Environmental Leadership. Natalia's key strengths and areas of expertise are in drafting EIAR report chapters, environmental impact assessment screening reports, wind farm feasibility studies and QGIS mapping. Since joining MKO in September 2023, Natalia has been involved in a range of wind farm projects, assisting with field work, client briefing notes, constraints mapping and drafting EIAR chapters, with more projects in the pipeline.

Órla works with and co-ordinates large multidisciplinary teams including members from MKO's Environmental, Planning, Ecological and Ornithological departments as well as sub-contractors from various fields in the preparation and production of EIARs. Órla Murphy is a Senior Environmental Scientist with McCarthy Keville O'Sullivan Ltd. with over 10 years of experience in private consultancy. Órla holds a BSc (Hons) in Geography from Queens University Belfast & a MSc in Environmental Protection and Management from the University of Edinburgh. Prior to taking up her position with McCarthy Keville O'Sullivan in January 2018, Órla worked as an Environmental Project Assistant with ITPEnergised in Scotland. Órla's key strengths and areas of expertise are in Environmental Protection and Management, EIA, Project Management, Renewable Energy and Peatland Management, where she has carried out research projects and site work relating to restoration and management of peatland sites in both Scotland and Northern Ireland. On joining MKO Órla has been involved on a range of renewable energy infrastructure projects. In her role as a project manager, Órla works with and co-ordinates large multidisciplinary teams including members from MKO's Environmental, Planning, Ecological and Ornithological departments as well as sub-contractors from various fields in the preparation and production of EIARs. Within MKO, Órla plays a role in the management of and sharing of knowledge with junior members of staff and works as part of a large multi-disciplinary team to produce EIA Reports.

5.1.2 Relevant Guidelines

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:

- Department of Health – Health in Ireland: Key Trends 2024;
- Environmental Impact Assessment of National Road Schemes- A practical Guide, National Roads Authority/ Transport Infrastructure Ireland, Revision 1, November 2008;
- Fáilte Ireland EIAR Guidelines for the Consideration of Tourism and Tourism Related Projects, July 2023.
- Health Impact Assessment Resource and Tool Compilation, United States Environmental Protection Agency 2016;
- Health Impact Assessment Guidance, Institute of Public Health Ireland. 2021;
- Framework for Human Health Risk Assessment to Inform Decision Making developed by the United States Environmental Protection Agency (US EPA) 2014;
- Institute for Environmental Management and Assessment (2017) Health in Environmental Impact Assessment: A Primer for a Proportionate Assessment;
- Institute for Environmental Management and Assessment (2022) Determining Significance for Human Health in Environmental Impact Assessment;
- Central Statistics Office (CSO): Census of Ireland 2016; Census of Ireland 2022; Census of Agriculture 2020;
- Mayo County Development Plan 2022-2028;
- The World Health Organisation (WHO) Environmental Noise Guidelines for the European Region (WHO, 2022 Update) https://www.who.int/
- Best Practice Guidelines for the Irish Wind Energy Industry, IWEA, 2012.
- British Horse Society's *'Advice on Wind Turbines and Equestrian Access* (2025).

5.1.3 Scoping

Chapter 2 Background of the Proposed Project of this EIAR describes the scoping and consultation exercise undertaken for the Proposed Project. 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 September 2025 including the IAA and 2RN; please see Section 15.2.4 of Chapter 15 Material Assets for further details.

National Environmental Health Service

A scoping response was received from the Health Service Executive (HSE) on the 15th of June 2023 and 9th of March 2026. In the most recent scoping response received, the HSE 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; and
- 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 Proposed Project, any positive likely significant impacts should also be assessed.

The National Environmental Health Service (NEHS) recommends that the following matters are included and assessed in the EIAR:

- Public Consultation
- Population and human health
- Decommissioning phase of the proposed wind farm
- Siting and location of turbines
- Noise & Vibration
- Shadow Flicker
- Air Quality
- Surface and Groundwater Quality
- Ancillary facilities
- Cumulative impacts
- Climate
- Health gain

The NEHS provided feedback and recommendations on the following topics:

- Public Consultation
- Population Health and Human Health
- Opportunities for Health Gain
- Non-Technical Summary
- Decommissioning
- Siting, Location and details of turbines
- Assessment of consideration of alternatives
- Noise and vibration
- Lived experiences of communities
- Shadow flicker
- Air quality
- Surface and groundwater quality
- Geotechnical and peat stability assessment
- Gas network infrastructure

- Ancillary facilities
- Cumulative impacts
- Climate and climate mitigation
- Climate vulnerability

Impacts from shadow flicker are assessed in Section 5.4 and 5.5.3.2.7. An assessment of effects on human health as a result of impacts to air quality are assessed in Section 5.5 and in more detail within Chapter 10 Air Quality. An assessment of effects on human health as a result of impacts to water quality are assessed in Section 5.5.3.2.3 and in more detail within Chapter 9 Water. An assessment of effects on human health as a result of impacts from noise and vibration are assessed in Section 5.5.3.2.4 and in more detail within Chapter 12 Noise and Vibration. The HSE also ask that the public be consulted with in the context of the Proposed Project – the result of the community consultation is included in Appendix 2-2 Community Engagement Report.

Uisce Éireann

A scoping response was received from Uisce Éireann on the 7th of June 2023, outlining the measures to be considered in the scope of an EIA where relevant, such as avoidance of negative impact to Irish Uisce Éireann Drinking Water Source(s) during the construction and operational phases of the development and assessment on potential impacts on nearby as public water supply infrastructure.

A follow up data request was issued to Uisce Éireann on the 26th of June 2023 and 23rd of April 2026 for Uisce Éireann infrastructure (water distribution and sewer network data) at the Site. The results of the data request found that there are underground water or sewerage networks within the Proposed Project footprint, these have been considered and are assessed in Section 5.5.2.2.3 and Section 5.5.3.2.3 and in more detail in Chapter 15 Material Assets, Section 15.3.4.1.3 and Section 15.3.5.

Fáilte Ireland

A scoping response was received from Fáilte Ireland on the 7th of June 2023 and 25th of February 2026 and provided the *'Fáilte Ireland's Guidelines for the Treatment of Tourism in an EIA'*, to inform the preparation of the Environmental Impact Assessment for the Proposed Project. 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, these have been considered and are assessed in section 5.5.2.1.5 and Section 5.5.3.1.5.

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 2023[1] was also considered in this assessment. See Section 5.3.2 below.

In order to assess the population in the vicinity of the Proposed Project, the Population Study Area for this population assessment focuses on the EDs within and adjacent to the Site, namely Cloghermore ED and Mayo ED as well as utilising regional and national census (2022) data.

[1] *Failte Ireland (2023) EIAR Guidelines for the Consideration of Tourism and Tourism Related Projects*

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*".

5.2.2.1 National Guidance

The '*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*[2]' (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 arising from the Proposed Project 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 Soils and Geology, Chapter 9 Water, Chapter 10 Air Quality, Chapter 11 Climate, Chapter 12 Noise and Vibration, Chapter 13 Landscape and Visual and Chapter 15 Material Assets (including Traffic and Transport).

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 Guidelines (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 Guidelines (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*

[2] *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>

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*'[3] 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,

[3] *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*

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 IEMA 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 IEMA 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.

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 oktas. 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.'[4]

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.

[4] *Met Éireann, www.met.ie*

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 Wind Energy Development Guidelines Department of Housing and Local Government (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.

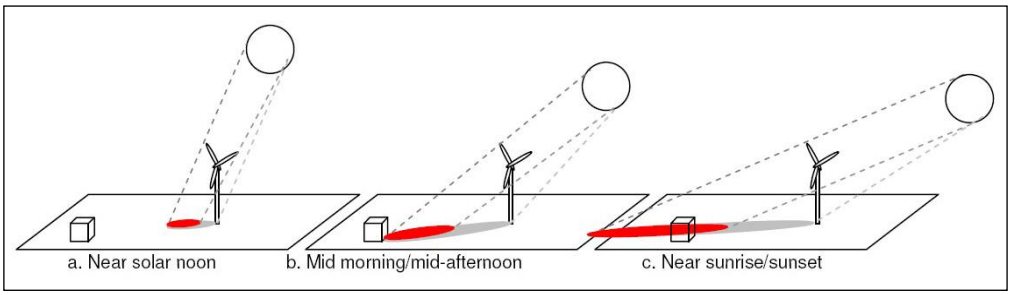

Figure 5-1 Shadow-Prone Area as Function of Time of Day (Source: Shadow Flicker Report, Helimax Energy, Dec 2008)

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 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. [5]

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 worst-case assessment as detailed in Section 5.5.3.1.4. 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

[5] *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*

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.

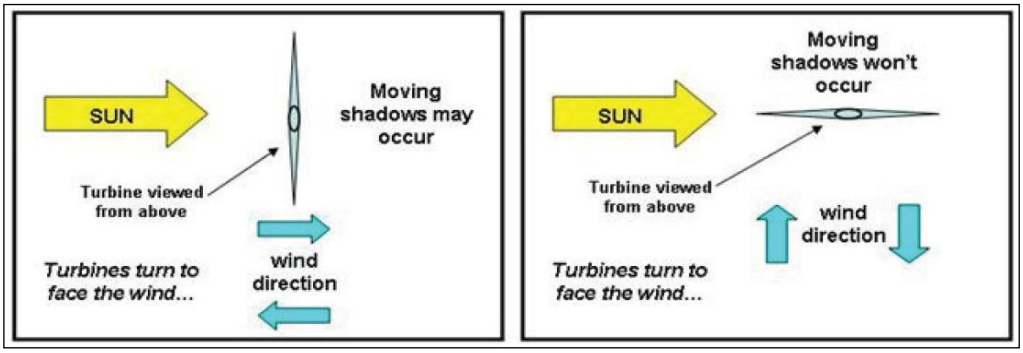

Figure 5-2 Turbine Blade Position and Shadow Flicker Impact (Source: Wind Fact Sheet: Shadow Flicker, Noise Environment Power LLC)

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 relevant guidance for shadow flicker in Ireland is derived from the Wind Energy Development Guidelines 2006 (DoEHLG, 2006) herein referred to as 'the Guidelines (DoEHLG, 2006)' and the '*Best Practice Guidelines for the Irish Wind Energy Industry*' (Irish Wind Energy Association (IWEA), 2012). The Guidelines (DoEHLG, 2006) state that at distances greater than 10 rotor diameters from a turbine, the potential for shadow flicker is very low. Therefore, the area within 10 rotor diameters of the Proposed Turbines will act as the study area adopted for the shadow flicker assessment (i.e. for the Proposed Wind Farm, this is assumed at 1.36 km based on a maximum rotor diameter of 136 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.

The Guidelines (DoEHLG, 2006) threshold of 30 hours per year or 30 minutes per day applies to properties located within 500 metres of a proposed turbine location.

Although the Guidelines (DoEHLG, 2006) thresholds apply to dwellings located within 500 metres of a Proposed Turbine, for the purposes of this assessment, the guideline thresholds of 30 hours per year or 30 minutes per day have been applied to all sensitive receptors located within the Shadow Flicker Study Area Site (as per IWEA Best Practice Guidelines, 2012).

The Guidelines (DoEHLG, 2006) are currently under review. The Department of Housing, Local Government and Heritage released the 'Draft Revised Wind Energy Development Guidelines' (hereafter referred to as the 'Draft Guidelines (DoHPLG, 2019)') for public consultation in December 2019. 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).

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 current Guidelines (DoEHLG, 2006) (30 hours per year or 30 minutes per day), 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 Guidelines (DoHPLG, 2019) through the stricter implementation of the mitigation measures outlined in Section 5.5.3.2.7.

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 proposed turbines. 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) or WindFarmer (DNV.GL) or 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

[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*

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 4.1.292 (August 2024) has been used to predict the level of shadow flicker associated with the Proposed Wind Farm. 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 Turbines to be installed on the Site will have a ground-to-blade tip height, hub height and blade length of the following dimensions:

- Turbine Tip Height – 160m
- Hub Height – 92m
- Rotor Diameter – 136m

With the benefit of the mitigation measures outlined in Section 5.5.3.2.7, any turbine to be installed onsite will 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). This will be achieved through the use of turbine control software during the entire operational period of the Proposed Project. Any references to the turbine dimensions in this shadow flicker assessment should be considered in the context of the above.

5.2.3.5 Shadow Flicker Study Area

At the outset of the Proposed Project, during the constraints mapping process detailed in Chapter 3 Consideration of Reasonable Alternatives of this EIAR, all sensitive receptors were identified and mapped. This included all inhabitable and uninhabitable properties. In addition, a planning history search to identify properties that may have been granted planning permission, but not yet been constructed, was carried out. Any property with a valid planning permission for a dwelling house was also added to the sensitive receptors' dataset.

The Shadow Flicker Study Area for the shadow flicker assessment is ten times rotor diameter (136m rotor diameter x 10 = 1.36km). 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 therefore the shadow flicker study area is set at 1.36km from the proposed turbines. All inhabitable dwellings within 1.36km of the proposed turbines have been considered as part of the following shadow flicker assessment.

There are 90 sensitive receptors located within Shadow Flicker Study Area, 1.36 kilometres (10 x 136m rotor diameter) of the proposed turbine locations as shown in Figure 5-3 below. For the purposes of the shadow flicker assessment, all sensitive receptors within the Shadow Flicker Study Area were identified and mapped. In addition, a planning history search to identify properties that may have been granted planning permission, but have not yet been constructed, was carried out. Any property with a valid planning permission/application for a dwelling was also added to the sensitive receptor dataset. The Shadow Flicker Study Area and sensitive receptors' locations are shown in Figure 5-3, with all properties detailed in Table 5-9 in Section 5.4.1 below.

5.2.3.5.1 *Equestrian Impact*

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. The closest registered stud farm is Claremorris Saddlery & Equestrian Centre, Galway Road, Lisduff, Claremorris, approximately 7km southeast of the nearest proposed turbine (T01). Therefore, no registered thoroughbred stud farms, stables, or other equestrian facilities are included as sensitive receptors for the purposes of shadow flicker assessment.

[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*

Map Legend

- EIAR Site Boundary
- Proposed Turbines
- Shadow Flicker Study Area - 1.35km
- Dwellings within Shadow Flicker Study Area

Drawing Title
Shadow Flicker Study Area

Project Title
Proposed Cunlaghfadda Green Energy Project

Drawn By	Checked By
JA	NS
Project No. 220825	Drawing No. Figure 5-3
Scale 1:16,000	Date 2026-05-14

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.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 this 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 5.5.3.2.7

Due to the latitude of Ireland, shadow flicker impacts are only possible at properties 130 degrees either side of north (i.e., a shadow flicker event can occur within a 260-degree span), as turbines do not cast shadows on their southern side[9]. As such, properties located outside of this potential shadow flicker zone (50 degrees either side of south) will not be impacted. However, in taking a precautionary approach for this assessment, all properties within 360 degrees of the proposed turbine locations out to 1.36km were assessed for shadow flicker impact.

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.

[9] *House of Commons ODPM Annual Report and Accounts 2004: Housing, Planning, Local Government and the Regions Committee; Planning Policy Statement 22*
Department of Housing, Planning and Local Government Dec 2019 Draft Revised Wind Energy Development Guidelines. Rialtas Na hÉireann. Available at: https://www.gov.ie/en/publication/9d0f66-draft-revised-wind-energy-development-guidelines-december-2019/

- 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 12.08% of the daylight hours per year. This percentage is based on Met Éireann data recorded at Claremorris weather station over the 30-year period from 1971-2000 (www.met.ie). The Met Éireann weather station at Claremorris Weather Station, which is located approximately 6 km to the northeast of the Site, is the nearest weather and climate monitoring station to the Site that has meteorological data recorded for the 30-year period from 1971-2000. The actual sunshine hours at the Site and therefore the percentage of time shadow flicker could actually occur is 24.44% of daylight hours. Where the annual shadow flicker is calculated for each property, it is corrected for the regional average of 24.44% sunshine, to give an accurate annual average shadow flicker prediction. Table 5-9 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.

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 County Mayo County Development Plan 2022-2028, 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 2010 and from the CSO website (www.cso.ie). Census information is divided into State, Provincial, County, Major Town, Electoral Division (ED) level.

The Site is located within a rural setting, approximately 5.3km to the northwest of Claremorris town centre, in County Mayo. The settlement of Mayo Abbey is located approximately 2.3km northwest of the Site. Please refer to Figure 1-1 of Chapter 1 Introduction for the Site Location map. The Site measures approximately 165 hectares. The Site falls within the townlands listed in Table 1-1 of Chapter 1. Land use at the Site predominantly comprises a mix of pastoral agriculture, peat bogs and private forestry. Land-use in the wider landscape of the site comprises a mix of agriculture, peat cutting, quarrying, low density residential and commercial forestry. Nearby roads will be used for the construction and operational phases of the Proposed Project including a new temporary site entrance via the local L1505 road and upgrades to the existing L15053 road consisting of road widening works.

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 the Electoral Divisions (EDs). The Site lies within 2 No. EDs, Mayo ED and Cloghermore ED 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 602 persons as of 2022. The total land area of the Population Study Area totals 40.29km^{2}and comprises Mayo ED of 26.7km^2 and Cloghermore ED of 13.59km^2.

- Cloghermore ED (165 persons)
- Mayo ED (437 persons)

The closest sensitive property is located approximately 643m from the nearest proposed turbine (T1) i.e. over 4x tip height set back (as recommended in the Draft Guidelines (DoHPLG, 2019)).

For the purposes of the population baseline assessment, the Proposed Project will be examined as a whole from a population perspective due to elements relating to the Proposed Wind Farm and Proposed Grid Connection being located within the Site. Where the Proposed Wind Farm and the Proposed Grid Connection are required to be considered separately, this is identified within the baseline assessment.

Map Legend

- EIAR Site Boundary
- Population Study Area

Cunlaghfadda Wind Farm Electoral Divisions

- Cloghermore
- Mayo

Drawing Title: Population Study Area	
Project Title: Proposed Cunlaghfadda Green Energy Project	
Drawn By: JA	Checked By: NS
Project No.: 220825	Drawing No.: Figure 5-4
Scale: 1:45,000	Date: 2026-05-14

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

5.3.1.1 Population Trends

The recently published Census of 2022 shows that the population of County Mayo grew by 6% to 137,970 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 Mayo and the Population Study Area have been obtained from the Central Statistics Office (CSO) and are presented in Table 5-1 below.

Table 5-1 Population 2016 – 2022 (Source: CSO)

Area	Population Change		Percentage Population Change
	2016	2022	2016– 2022
State	4,761,865	5,149,139	+8%
County Mayo	130,023	137,970	+6%
Population Study Area	608	602	-0.9

The data presented in Table 5-1 shows that the population of the Population Study Area decreased by 0.9% between 2016 and 2022. This rate of population decrease is the opposite to that recorded at State and County level and signals a trend of rural migration within the population study area.

5.3.1.2 Population Density

The population densities recorded within the State, County Mayo and the Population Study Area during the 2016-2022 Census are shown in Table 5-2.

Table 5-2 Population Density in 2016-2022 (Source: CSO)

Area	Population Density (Persons per square kilometre)	
	2016	2022
State	68.06	71.47
County Mayo	23.35	24.69
Population Study Area	15.02	14.87

The population density of the Population Study Area recorded during the 2022 Census is 14.87 persons per km^2 which is considerably lower than the national population densities of 71.47 persons per km^2 and lower than the population density of County Mayo, recorded at 24.69 persons per km^2. Mayo ED has the higher population density of both electoral divisions with 16.2 persons per km^2 and Cloghermore ED with 12.1 persons per km^2.

5.3.1.3 Household Statistics

The number of households and average household size recorded within the State, County Mayo and the Population Study Area during the 2016 and 2022 Censuses are shown in Table 5-3.

Table 5-3 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	1,697,665	2.8	1,841,152	2.74
County Mayo	48,745	2.75	51,996	2.59
Population Study Area	232	3.02	232	2.61

The figures in Table 5-3 show that the number of households within the State and County increased from 2016 to 2022, whilewithin the population study area, the average number of households remained the same.. In the Population Study Area, the average household size is largely the same as those observed at State and County level during the same period.

5.3.1.4 Age Structure

Table 5-4 presents the population percentages of the State, County Mayo 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 5-4 Population per Age Category in 2022 (Source: CSO)

Area	Age Category				
	0 - 14	15 – 24	25 - 44	45 - 64	65 +
State	19.66%	12.52%	27.62%	25.12%	15.08%
County Mayo	19.11%	10.86%	23.47%	26.75%	19.81%
Population Study Area	18.77%	9.8%	19.44%	29.4%	22.59%

County Mayo's population in April 2022 was comprised of 137,970. The average age of County Mayo's population in April 2022 was 41.6 years, compared with 40.2 years in April 2016. Nationally, the average age of the population was 38.8, up from 37.4 in April 2016. This age group increased by 19% to 27,328 in County Mayo, and by 22% to 776,315 at a national level since 2016. The proportion of the Population Study Area population within each age category has higher rates of older populations than 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.

The age category results in the Population Study Area in particular correspond with the trend of younger generations migrating towards larger towns and cities for greater employment and education opportunities. The decrease in the already lower than national average in the percentage of those in the

0-14 age range and increase in those in the 65+ age range between 2016 and 2022 also further shows the aging population within the Population Study Area.

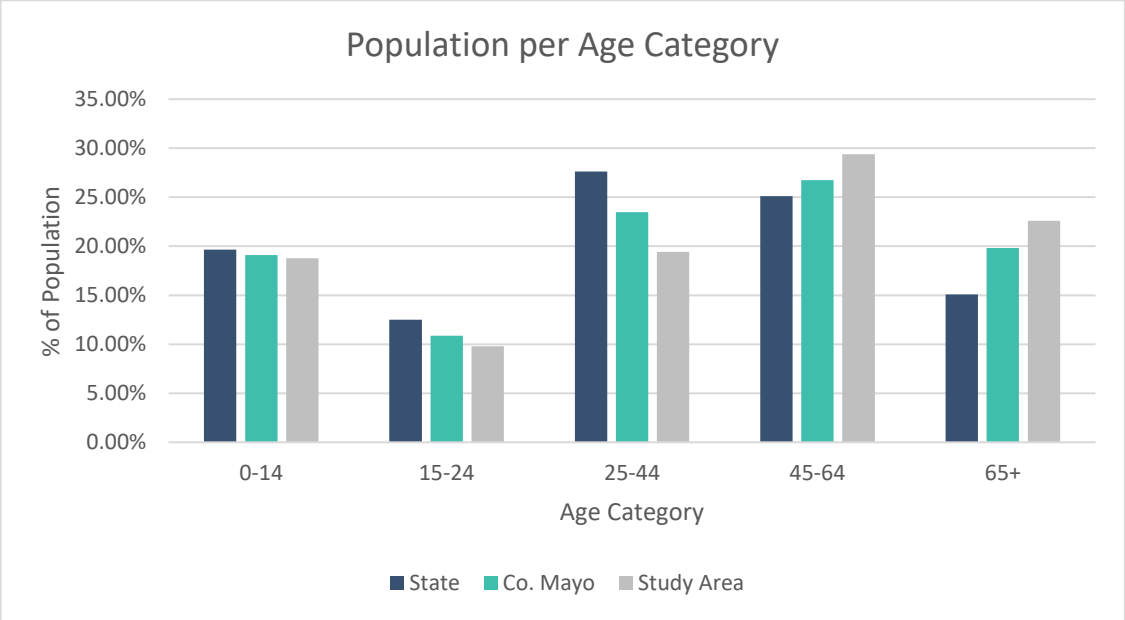

Figure 5-5 Population per Age Category in 2022 (Source: CSO)

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 58,334 people (aged 15 and over) at work in County Mayo, an increase of 6,895 people (+13%) between 2016 and 2022. Nationally, there were 313,656 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 5-5 shows the percentage of the total population aged 15+ who were in the labour force during the 2022 Census.

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

Status		Republic of Ireland	County Mayo	Population Study Area
% of population aged 15+ who are in the labour force		**62%**	**52.27%**	**61.18%**
% of which are:	At work	92.67%	91.12%	93.02%
	First time job seeker	1.36%	1.41%	0.66%
	Unemployed	6.96%	7.46%	6.31%
% of population aged 15+ who are not in the labour force		**38.82%**	**42.64%**	**38.82%**

Status		Republic of Ireland	County Mayo	Population Study Area
% of which are:	Student	28.60%	22.74%	25.13%
	Home duties	16.96%	15.61%	15.18%
	Retired	40.96%	48.44%	51.31%
	Unable to work	11.79%	11.36%	7.33%
	Other	1.69%	1.84%	1.05%

Overall, the principal economic status of those within the labour force living in Population Study Area is lower than that recorded at State but higher than that of County level, with between 0 to 9% average difference apparent. 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 the same as figures recorded at national and County level that show 'Retired' as the highest category.

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.

5.3.1.5.2 *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 Mayo, and the Population Study Area during 2022.

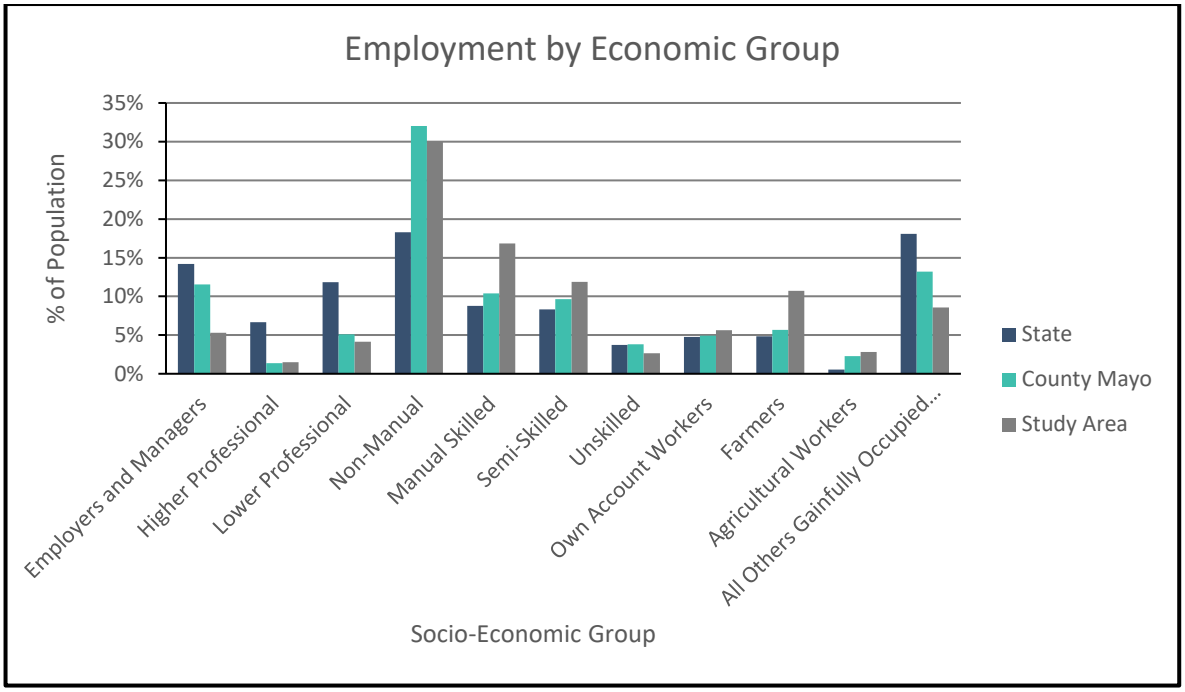

Figure 5-6 Persons in private households by socio-economic group in 2022 (Source: CSO).

The highest level of employment within the Population Study Area was recorded in the Non-Manual category. While this was notably higher than the State figure, it was slightly lower than that recorded for County Mayo. Employment levels in the Study Area for Employers and Managers and Higher Professional categories were lower than the State but higher than County Mayo.

Employment within the Lower Professional, Skilled Manual, and Unskilled categories was lower in the Study Area compared to both the State and County Mayo, while levels in the Semi-Skilled category were marginally higher than both. The proportion of Farmers and Agricultural Workers in the Study Area exceeded those recorded at both County Mayo and State levels. Employment in the Own Account Workers category was broadly comparable across all three areas. The proportion classified as All Other Gainfully Occupied was significantly lower in the Study Area than in both County Mayo and the State.

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'* 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'*, 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[10] 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.

Further information on energy and climate change targets is detailed in Section 1.5 of Chapter 1, Sections 2.2 to 2.4 of Chapter 2 and Chapter 11 of this EIAR.

Employment Potential

The 2014 report *"An Enterprising Wind: An economic analysis of the job creation potential of the wind sector in Ireland"* 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 4.8GW as of December 2024, 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[11] 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'.* Furthermore, '*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'.*

The 2014 report '*The Value of Wind Energy to Ireland*', published by Pöyry, 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

[10] *SEAI (2019), https://www.seai.ie/publications/Wind_Energy_Roadmap_2011-2050.pdf*
[11] *SEAI (2019), https://www.seai.ie/publications/Wind_Energy_Roadmap_2011-2050.pdf*

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'* 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[12] (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'* 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.'*

As of January 2025, there were 6.3GW of installed wind energy capacity on the island of Ireland[13]. Of this, 4.9GW 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 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'*, 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 4.1 GW 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 €0.1bn (€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 70 by 30 Implementation Plan Reports 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'.*

[12] *https://www.marei.ie/our-climate-neutral-future-zeroby50/*
[13] *Eirgrid, https://www.eirgrid.ie/grid/system-and-renewable-data-reports*

The Proposed Project 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 Site are predominantly agricultural pasture, private forestry and turf cutting. The primary surrounding land use within the Population Study Area is agricultural and residential /commercial. The total area of farmland within the Mayo ED, around the Site, measures approximately 1,859 hectares, taking up 45.9% of the Population Study Area. Cloghermore ED measures approximately 1,076 hectares which is of 26.6% of the Study Area according to the CSO Census of Agriculture 2020. There are 70 farms located within the Mayo ED, with an average farm size of 26.6 hectares. In Cloghermore ED there are 39 farms in total, with an average size of 27.6 hectares. Table 5-6 shows the breakdown of farmed lands within Mayo and Cloghermore Electoral Divisions. Grassland accounts for the whole proportion of farmland.

Table 5-6 Farm Size and Classification within the Population Study Area in 2020 (Source: CSO)

Electoral Division	No of holdings	Average size (hectares)	Median age of holder	Livestock units	Total Cereals (hectares)	Area farmed (hectares)
Mayo	70	26.6	59	2,334	0	1,858.6
Cloghermore	39	27.6	50	1,564	0	1,076.5
Total	109	26.6 (average)	59 (average)	2,334	0	2,035.10
Size of Study Area			4,049 hectares			
Total Area Farmed within Study Area			2,035.10 hectares			
Farmland as % of Study Area			50.26%			

5.3.1.7 Services

The Site is located approximately 5.3km to the northwest of Claremorris town centre. Other settlement areas in the wider region include Castlebar, located approximately 16km to the north-west of the Site. Both centres provide retail, recreational, educational, and religious services.

5.3.1.7.1 *Education*

A number of primary schools are located within the vicinity of the Site. The nearest primary school is Mayo Abbey National School approx. 2km northwest of the Site. Mount Saint Michael Secondary School is located approx. 5km southeast of the Site. The Mayo College of Further Education and Training (third-level education) is located approximately 5km southeast of the Site.

5.3.1.7.2 *Access and Public Transport*

The Site is accessed via a number of local roads. There are no local bus services located within or adjacent to the Site. The nearest Local Link service is located in Claremorris which provides a service from Claremorris to Ballina on the Bus Éireann 421 route via the R311. The nearest train station to the Site is the Claremorris train station 5km southeast of the Site providing connections with Dublin Heuston and Westport and Ballina.

Claremorris is a commuter town for both Galway and Castlebar through a local road network. The town is served by both N17 and the N60 roads, as well as frequent buses and trains. Claremorris also lies on the main rail line from Dublin to Westport.

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. Claremorris GAA club is located approximately 7.2km southeast, Mayo Gaels GAA is 6.4km northwest, Claremorris Golf Club is approximately 7.8km southeast, Woofland Dog Park is 6.5km south, Hollymount GAA is 12.8km southwest, Balla GAA is 12km northwest, Davitts GAA is 12.8 southeast, Garrymore GAA is 13.1km south and Eastern Gaels is 15.8km east of the Site. Amenities and community facilities, including other sports clubs, youth clubs, and recreational areas are located in Claremorris and Castlebar.

Community Gain proposals, which would provide the opportunity to enhance local amenities and community facilities are described in Section 4.1 of Chapter 4 Description of the Proposed Project.

5.3.2 Tourism

For the purposes of this section, the Site is considered solely in relation to the tourism baseline assessment set out below. Due to the temporary nature of the works and any potential effects associated with the Proposed Grid Connection, it has been scoped out from the tourism assessment that follows.

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*[14], pertaining to domestic and international tourism volumes for Ireland, was published by Failte Ireland in October 2025 for the year 2024. In 2024, out-of-state (overseas and Northern Ireland) tourist expenditure amounted to €6.6 billion. An additional €1.5 billion was spent by overseas visitors on fares to Irish carriers, taking total foreign exchange earnings to over €8 billion. Expenditure from domestic tourism amounted to €3.6 billion, making tourism an almost €12 billion industry annually. Expenditure from domestic tourism amounted to €3.6 billion, making tourism an almost €12 billion industry annually. 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."*

The Republic of Ireland is divided into seven tourism regions. Table 5-7 shows the total revenue and breakdown of overseas tourist numbers to each region in Ireland during 2024 ('*Key Tourism Facts 2024*, Fáilte Ireland, October 2025).

Table 5-7 Overseas Tourists Revenue and Numbers 2024 (source Fáilte Ireland)

Region	Total Revenue (€m)	Total Number of Non-Domestic Tourists (000s)

[14] *Fáilte Ireland (2025) Key Tourism Facts 2024 <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>*

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 West Region, in which the Site is located, comprises Counties Galway, Mayo, and Roscommon. This Region benefited from approximately 13% of the total number of overseas tourists to the country and approximately 13% of the total tourism income generated in Ireland in 2019.[15]

Table 5-8 presents the breakdown of tourist numbers and revenue to County Mayo during 2024 ('*Mayo Key Tourism Facts 2024',* Fáilte Ireland, August 2025) [16]. As can be observed in Table 5-8, County Mayo had a higher number of Domestic tourists than Overseas tourists visiting the County during 2024, with each group generating tourism revenue of €138 million and €222 million 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.

Table 5-8 Tourism to Mayo during 2024 (Source: Fáilte Ireland)

County	Overseas Tourists	Domestic Tourists
Revenue Generated (€m)	138	222
No. of Tourists (000s)	212,000	809,000
Average Spend per capita (€)	652	275
Average nights spent in County	5.6	2.9

5.3.2.2 Tourism Attractions

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

Tourism Attractions within the surrounding landscape

The nearest tourist attraction to the Proposed Project is the Land of the Giants, McMahon Park, Clare Lake, Claremorris, Co. Mayo, located c. 5.5km southwest of the Site.

County Mayo has a wide range of nationally significant tourism assets which include the following:

[15] *Overseas Tourists Revenue and Numbers 2024 (source Fáilte Ireland)*
[16] *Failte Ireland (2025) Mayo 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_Mayo.pdf?ext=.pdf*

- Achill Experience Aquarium and Visitor Centre- Achill's visitor centre and Mayo's only Aquarium, 99km northwest of the Site.
- Céide Fields- The Céide Fields heritage centre is 85.2km north of the Site.
- Croagh Patrick- mountain with a height of 764 m, which is 50.9km west of the Site.
- Great Western Greenway is a 43.5km traffic free walking & cycling facility connecting two tourism destinations - Westport and Achill Island and is 40.4km west of the Site.

Archaeological sites and monuments are part of Irish national heritage and are recognised tourist attractions across the country. Record of Monuments and Places (RMP) sites under the National Monuments Legislation (1930–2014) within 10km of the nearest turbine are listed below. It should be known that not all of these National Monuments are publicly accessible. Please see Chapter 14 Archaeological, Architectural and Cultural Heritage for further details.

- Round Tower (AH95) (PO No. 77/1939) (NM No. 403) in Balla townland, c. 6.5km northwest of T7.
- Crannóg (AH96, PO No. 10/1987) in Derry townland, c. 9.1km east-northeast of T4; and
- A Rath (AH97, PO No. 6/1957) in Gallgort townland, c. 9.2km west-southwest of T1.

5.3.2.3 Tourist Attitudes to Wind Farms

5.3.2.3.1 *Scottish Tourism Survey 2021*

BiGGAR Economics undertook an independent study in 2021, entitled '*Wind Farms & Tourism Trends in Scotland: Evidence from 44 Wind Farms'* 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:

> "*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*'.[17]

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 landscape 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:

[17] *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>

> *"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 the Proposed Project throughout the design and assessment processes. Reference has been made to the '*Planning Guidelines on Wind Energy Development 2006*' and the '*Draft Revised Wind Energy Development Guidelines December 2019*' in addition to 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'. 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 5.5 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.[18] 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 72% of all respondents who live less than 1km from wind farms hold positive or very positive views towards wind energy, while 73% of respondents who live less than

[18] *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>*

1km away from a Renewable Electricity Support Scheme (RESS) wind project hold positive or very positive attitudes towards wind energy.

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.

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 public's 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.[19] In response, the SEAI (formerly SEI) commissioned a survey aimed at identifying public attitudes to renewable energy and to wind energy in Ireland.[20] 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.

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

[19] *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*
[20] *Ibid.*

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 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[21], published by the SEAI, showed that 47% of Irish adults polled 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.

[21] *Interactions Research, 2017. Segmentation of the Energy Consumer Market in Ireland. Available at: https://interactions.ie/wp-content/uploads/2020/06/20190212-Full-Report.pdf*

5.3.3.2 Public Perceptions of Wind Power in 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). 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 has two wind farms in proximity.

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 farm projects than existing wind farm sites. 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 pg. 866 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, may 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 impacts of wind farms, such as interference with telecommunications and shadow flicker were not 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 impact 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", and "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 Public Attitudes Monitor 2022*

Published in December 2022, IWEA 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 sample 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 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, Wind Energy Ireland (WEI) published the results of their most recent nationwide annual poll on attitudes to wind energy, the Public Attitudes Monitor.[22] 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 is 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 Wind Energy Ireland 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[23]. 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 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

[22] https://windenergyireland.com/about-wind/more-resources/annual-wind-survey
[23] *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

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 Wind Energy Ireland 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 2024, 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[24] similarly investigates the relationship between 'near neighbours' of Wind Farms and provides excellent 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, and their willingness to accept further onshore wind energy developments. Data was collected through an online survey conducted from May to July 2021 and July to August 2022. The survey focused on residents living near to existing wind farms at the planning, construction and operational phases of these developments and asked respondents about their 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 within 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.

[24] *le Maitre et al. (2024) 'Do concerns about wind farms blow over with time? Residents' acceptance over phases of project development and proximity'*

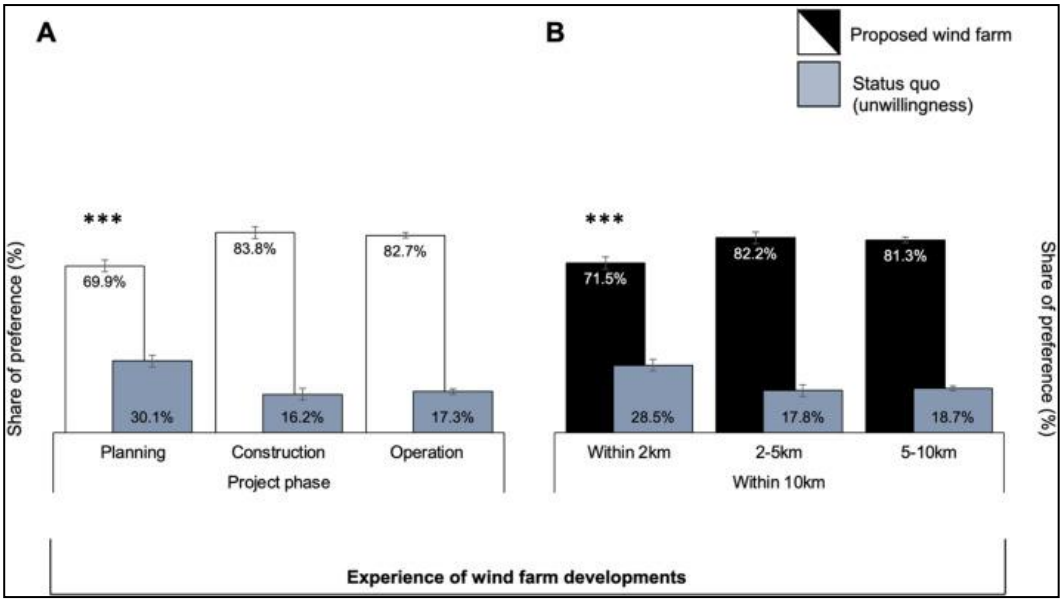

Figure 5-7: Share of preference for a 'best-case' combination of wind development features and the status quo (A) over phase of project development; and (B) over proximity to the wind farm. (Le Maitre et al. 2024)

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 also 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 and Dublin (which was intentionally statistically underrepresented compared to population density 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 currently within the planning phase are more likely to be unwilling to accept further wind farm developments than those who live in proximity to a wind energy development either under construction, or within the operational phase. It should also be noted that in all cases, a majority of respondents display moderate to strong willingness for additional wind farm development in the area. Similarly, respondents living within 2km of a wind farm development are less likely to accept further wind farm 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. As discussed in Section 5.3.2 above, this is factually incorrect based on the findings of a range of studies. 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 wind farm 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 the developer, both of which have been carried out as part of the Proposed Project community engagement process (as detailed in Appendix 2-2 of this EIAR).

To conclude, this study illustrates that whilst negative sentiments towards wind energy developments are 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 are likely to hold 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, which the Proposed Project has comprehensively addressed in Appendix 2-2 of this EIAR.

5.3.4 Health Effects of Wind Farms

5.3.4.1 Introduction

The 2022 Census of Ireland as carried out by the Central Statistics Office provides the general health conditions of the population of the EDs which make up the Population Study Area for the Proposed Project. The vast majority of those within the Population Study Area marked their general health as being 'very good' across all EDs. It is not anticipated that the general health of the population of the Population Study Area be altered due to the Proposed Project.

5.3.4.2 Health Impact 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*[25]

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 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."*

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

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*[26]

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*[27]

The purpose of this study was to examine the potential health effects of audible sound and inaudible infrasound 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 quality compared with the same speakers being present but not generating infrasound (sham infrasound).
- The study found no evidence 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*[28]

[26] http://psew.pl/en/wp-content/uploads/sites/2/2017/01/3b041e47d7f8029dfc10fee7d3249721.pdf
[27] https://pubmed.ncbi.nlm.nih.gov/36946580/
[28] 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

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*[29]

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:

> *"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.

[29] 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

6. ***'Wind Turbine Health Impact Study -Report of Independent Expert Panel' –*** *Massachusetts Departments of Environmental Protection and Public Health (2012)* [30]

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)* [31]

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 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.

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

- 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.* [32]

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 increased 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 is 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.

9. ***Infrasound Does Not Explain Symptoms Related to Wind Turbines:*** *Finnish Government's Analysis, Assessment and Research Activities (VN TEAS), 2020.* [33]

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.

[32] https://www.who.int/europe/publications/i/item/9789289053563
[33] https://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/162329/VNTEAS_2020_34.pdf?sequence=1&isAllowed=yvergleichbar

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'.*

5.3.4.3 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 and 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*"[34] 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 Proposed Project, 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 Proposed Project adheres to the criteria specified in both the IEC 61400-1 design requirements and the SEAI guidance.

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

Turbine blades are manufactured of fiberglass and wood which will prevent any likelihood of an increase in lightning strikes within the 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 will be installed during the construction of the turbine foundations.

5.3.4.4 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.

The ESB document 'EMF & You' (ESB, 2017)[35] 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.

5.3.4.5 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*' [36]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. 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.

Chapter 5 Population and Human Health (including Shadow Flicker), Chapter 8 Land, Soils and Geology, Chapter 9 Water, Chapter 10 Air Quality, Chapter 11 Climate, Chapter 12 Noise and Vibration and Chapter 15 Material Assets provide an assessment of the effects of the Proposed Project on these areas of consideration. These effects have been detailed below.

5.3.4.5.1 *Water Quality*

There are no mapped groundwater source protection areas for Public Water Supplies (PWS) or Group Water Schemes (GWS) in the Site or in the surrounding lands.

The closest GSI mapped source protection area to the Site is associated with the Pollavaddy GWS, located ~5.1km to the north.

---

[35] *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.*

[36] *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 source protection areas associated with the Kilcolman Facefield GWS and the Loughanemon Barnacarroll GWS are mapped ~5.45km and ~6km to the east of the Site respectively. The potential for impacts on these GWS's is unlikely due to the separation distance from the Site. Furthermore, groundwater at the Site will generally flow towards the rivers and lakes such as the Robe and Meander rivers at a local scale, to the west and south, and towards Lough Mask and Lough Cullin at a regional scale.

The nearest PWS is the Kilmaine PWS. The associated source protection area is located ~16km to the south of the Site. There is no potential for this PWS to be impacted by the Proposed Project due to the large separation distance. Furthermore, groundwater will flow towards Lough Mask and Lough Cullin.

An information request was submitted to Uisce Éireann for the location of all Uisce Éireann surface abstraction locations within 5km of the Site. 2 no. abstraction locations were identified downstream of the Site within the Moy and Killala Bay Catchment as follows:

- An abstraction associated with the Cullentra scheme is located along the tributary of the Meander River in the townland of Cullentragh, located ~1.5km to the west of the Site. The tributary stream referred to by the EPA as the Gortnagusetaul Stream originates ~1.6km from the Site. There are no hydrological connections from the Site to this stream.
- An abstraction associated with the Rathnacreeva scheme is located along the Meander River ~3.5km west of the Site. There is a hydrological connection from the Site to this river via manmade drainage features. The length of the hydrological flowpath between the Site and this abstraction point is >11km (this is the length between the point where the Meander River is closest to proposed infrastructure and the abstraction location).

The Site does not fall within the Claremorris urban wastewater treatment catchment.

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

A data request sent to Uisce Éireann on the 23rd of April 2025 indicated that a water mains runs through the Site. Should the Proposed Project receive planning permission, the water main will be diverted as agreed with Uisce Éireann under a diversion agreement. Please see Chapter 15 Material Assets for further detail.

As detailed in Chapter 9 Water, the assessments show that the residual effects in relation to water quality for the construction, operation and decommissioning phases of the Proposed Project are not significant and do not have the potential to cause negative health effects for human beings.

Air Quality and Climate

The Proposed Project is for 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 phase, the Proposed Project 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 and Section 11.5.3 of Chapter 11, which will contribute to positive effects on human health.

As detailed in Chapter 10 Air Quality and Chapter 11 Climate, the assessments show that the residual effects in relation to air quality for the construction, operation and decommissioning phases of the Proposed Project are not significant and do not have the potential to cause negative health effects for human beings.

Noise and Vibration

The extraction of material from the borrow pit is a construction phase activity of the Proposed Project which will be a temporary operation run over a short period of time. Hardcore materials will be extracted from the borrow pit (and some turbine locations, if necessary), principally by means of rock breaking. Depending on the hardcore volume, blasting may also be used as a more effective rock extraction method, capable of producing significant volumes of rock in a matter of milliseconds. These two methods are discussed below. The processing and crushing of cobbles and boulders may be required to achieve the grading requirements for use in construction. The potential noise and vibration impact on sensitive receptors associated with the rock extraction measures, are assessed in Chapter 12 of this EIAR.

Due to the linear progressive nature of the construction works associated with the access tracks and, internal cabling a fixed noise limit is proposed for the purpose of the assessment. This is deemed appropriate in that noise from associated construction activities is variable and typically occurs for a short period of time only and is at its highest when closest to the NSL. As the works progress, construction noise levels at the NSL will reduce due to the works taking place at greater distances, resulting overall in a shorter duration of exposure to noise impacts.

The associated construction works will occur for short durations (rolling construction method, approximately 100 – 150 m per day) at varying distances from NSLs. As the Proposed Grid Connection underground electrical cable route is approximately 982m in length, the works will be limited in duration. Review of the proposed 110kV underground grid cabling has identified that the nearest NSLs to the proposed underground cabling route, are at distances of the order of 223 to 330m.

It is considered that with the use of mitigation, the impact of the Proposed Project on Noise and Vibration will have a slight, negative effect on human health. As detailed in Chapter 12 Noise and Vibration, the assessments show that the residual effects in relation to noise and vibration for the construction, operation and decommissioning phases of the Proposed Project are not significant.

Telecommunications and Aviation

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 Proposed Project. Cunlaghfadda Green Energy Ltd (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 of Chapter 15 Material Assets.

As detailed in Chapter 15 Material Assets, the assessments show that the residual effects in relation to telecommunications and aviation for the construction, operation and decommissioning phases of the Proposed Project are not significant and do not have the potential to cause negative health effects for human beings.

5.3.4.6 Vulnerability of the Project to Natural Disasters and Major Accidents

An assessment of the Proposed Project's vulnerability to natural disasters can be found in Chapter 16 Major Accidents and Natural Disasters of this EIAR. A brief discussion can be found below.

As outlined in Section 5.2.2. 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 Proposed Project, 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 Site is addressed in the Geotechnical and Peat Stability Assessment Report included in Appendix 8-1 of this EIAR which concludes that the Proposed Project has an acceptable margin of safety and is suitable for wind farm development. The risk of flooding and potential for contamination of groundwater and drinking water due to the construction of the Proposed Project is addressed in Chapter 9 Water, 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 5.2.

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. There is a lower tier SEVESO site approximately 6.12km southeast from the Proposed Project. 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

This section summarises the largest and most recent studies from the United States and the UK and also provides a summary of an Irish working paper by the Centre for Economic Research on Inclusivity and Sustainable (CERIS).

In 2023 CERIS published a working paper entitled *'Wind Turbines and House Prices Along the West of Ireland: A Hedonic Pricing Approach'*.[37] This paper looked at wind turbine developments in Donegal, Leitrim, Sligo, Mayo, Galway, Kerry and Cork and associated property values. This working paper utilised satellite imagery to identify individual turbines and sourced its housing data from www.daft.ie; while the published price on Daft is not equivalent to the final agreed sale price, it was assumed that the listing and transaction prices are correlated. The findings of this research revealed a potential decrease in property values of -14.7% within a 0-1km radius of a wind turbine. However, the sample size of only 225 houses within this range does not adequately represent the broader landscape of Irish rural housing and the distribution of wind turbines. The author states that there are '*no significant reductions in house prices beyond 1km*' and that the effects seen within the 1km band were not persistent and diminished over the operational lifetime of the turbines. Considering that this is a working paper, based on a small sample size where local conditions have the potential to

[37] *Centre for Economic Research on Inclusivity and Sustainability (2023) Wind Turbines and House Prices Along the West of Ireland: A Hedonic Pricing Approach.* <https://www.universityofgalway.ie/media/researchsites/ceris/files/WP-2023-01.pdf>

disproportionately impact on the local housing market, further research is required before relying on its findings.

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[38]. 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 recently 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. 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 prices. 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.*'[39] This study targeted urban counties in the United States 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 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.

---

[38] *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*
[39] *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*

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'* 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) 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 UK scientific literature is strong in its conclusions that there are no significant effects on the 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 Proposed Project.

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'*[40] were:

- *To gather information on patterns of settlement and land use near to existing transmission infrastructure.*

[40] *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

- *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.

Based on the literature review and evidence-based field study described above it can be concluded that it is unlikely that the Proposed Grid Connection will have a significant effect on property values.

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 Proposed Project is located within a rural setting in south Mayo, approximately 5.3km to the northwest of Claremorris town centre. Castlebar is located approximately 16km to the north-west of the Site. The Site measures approximately 165 hectares and comprises a mix of pastoral agriculture, peat bogs and private forestry. The N60 National Road runs north-south approximately 1.3km to the east of the Site. The R331 Regional Road runs northeast -southwest, approximately 5.4km from the southern boundary of the Site. Existing access is via the local L15053 road to the south and the local L5536 road to the north.

When considering the amenity of residents in the context of a Proposed 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.) refers to shadow flicker assessment, Chapter 12 addresses noise and vibration). A comprehensive landscape and visual impact assessment has 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 Proposed Project are assessed in relation to each of these key topics and other environmental factors such as noise, traffic, and dust; see impacts in Section 5.5 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 51 sensitive receptors located within 1 kilometre of the proposed turbine locations.

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 Proposed Project, 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 2026 it is possible that the Draft Guidelines (DoHPLG, 2019) may be adopted during the consideration period for the current planning application.

It is considered that since noise emissions and shadow flicker are controllable via inbuilt turbine technologies, therefore, the Proposed Project is capable of compliance with any future guideline limits in this regard.

5.4 Shadow Flicker Assessment Results

5.4.1 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 24.44% 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 5-9.

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 500m of a proposed turbine location should not exceed a total of 30 minutes per day or 30 hours per year. As detailed in Section 5.2.3.4 there are no sensitive receptors within 500m of the proposed turbine locations.

The predicted shadow flicker levels have been modelled for all 90 no. sensitive receptors located within the Shadow Flicker Study Area (1.36km). The predicted shadow flicker model results indicate:

- 33 no. properties are theoretically predicted to experience zero shadow flicker;
- 57 no. properties are theoretically predicted to experience some shadow flicker;
  - It should be noted that of these properties, 3 no. are in derelict condition. Please see Table 5-9 below for details.
- Of the 90 sensitive receptors, 40 sensitive receptors are theoretically predicted to experience shadow flicker that exceeds the Guidelines (DoEHLG, 2006) thresholds for daily shadow flicker. Please see Table 5-9 below for details.

It is worth noting that the predicted exceedances of shadow flicker listed in Table 5-9 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 Proposed Wind Farm which is what the wind farm software assumes in its model.

Section 5.5.3.2.7 below details the mitigation measures that will be employed at the potentially affected properties to ensure that the Guidelines (DoEHLG, 2006) are complied with at any dwelling within the Shadow Flicker Study Area. The same mitigation measures (with stricter implementation of shadow flicker controls) also demonstrate 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 5-9 Potential Daily & Annual Shadow Flicker

House ID	ITM Coordinates (Easting)	ITM Coordinates (Northing)	Description	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 (hrs:min:sec)	Proposed Turbine(s) Giving Rise to Daily Shadow Flicker Exceedance
1	528692.1	777346	Dwelling	643	T1	00:00:00	00:00:00	00:00:00	N/A
2	529798.9	777945.6	Dwelling	647	T5	01:00:00	11:36:00	02:18:08	T2, T3, T4, T5, T6
3	527853.8	779099.1	Dwelling	658	T7	01:14:00	17:03:00	21:46:04	T2, T6, T7
4	528928.5	779061.7	Dwelling	658	T6	01:05:00	22:53:00	17:19:37	T2, T6, T7
5	529807.4	777987.1	Dwelling	667	T5	01:00:00	05:07:00	00:43:03	T2, T3, T4, T5, T6
6	528871.9	779085.8	Dwelling	672	T6	00:46:00	10:47:00	14:22:09	T2, T6, T7
7	527714	778927	Dwelling	676	T7	00:47:00	09:13:00	13:59:11	T2, T6, T7
8	529809.6	778023.6	Dwelling	681	T5	00:59:00	01:05:00	23:43:53	T2, T3, T4, T5, T6
9	529375.2	777110.9	Dwelling	696	T5	00:25:00	17:25:00	04:15:27	T1
10	529697.4	778545.2	Dwelling	698	T4	00:46:00	14:25:00	21:07:27	T2, T3, T4, T5, T6
11	529044	779084.3	Dwelling	713	T6	01:09:00	22:38:00	17:15:57	T2, T6, T7
12	529886.8	777642.9	Dwelling	725	T5	01:02:00	00:52:00	17:48:43	T3, T4, T5, T6
13	529906.1	777891.5	Dwelling	741	T5	00:50:00	02:11:00	18:08:01	T3, T4, T5, T6
14	529769.8	778507.1	Dwelling	744	T4	00:43:00	17:25:00	21:51:27	T2, T3, T4, T5, T6
15	529278	778991	Dwelling	753	T6	01:00:00	11:17:00	20:21:29	T2, T6, T7
16	527584.9	778083.8	Dwelling	755	T1	00:47:00	00:55:00	17:49:27	T1, T2, T3, T6, T7
17	529855.5	778120.3	Dwelling	757	T4	00:45:00	05:42:00	18:59:36	T3, T4, T5, T6
18	527626.9	778349.9	Dwelling	759	T7	00:44:00	03:26:00	06:10:21	T1, T2, T3, T6, T7
19	527560.2	778000.4	Dwelling	759	T1	00:52:00	17:16:00	15:57:15	T1, T2, T3, T6
20	529413.9	777057	Dwelling	759	T5	00:00:00	00:00:00	00:00:00	N/A
21	528466	779390	Dwelling	760	T7	00:00:00	00:00:00	00:00:00	N/A

22	527630.8	778962.2	Dwelling	766	T7	00:42:00	20:11:00	10:48:01	T1, T2, T6, T7
23	527543.2	777776.7	Dwelling	768	T1	00:48:00	15:13:00	15:27:11	T1, T2, T3
24	527873	777219	Dwelling	774	T1	00:05:00	01:16:00	00:18:35	T3
25	529390.9	778910.4	Dwelling	777	T6	00:44:00	12:01:00	14:40:15	T2, T3, T4, T6, T7
26	527647.9	779047	Dwelling	790	T7	00:44:00	22:57:00	11:28:36	T2, T6, T7
27	527707.7	779136.5	Dwelling	792	T7	00:55:00	13:03:00	14:55:24	T2, T6, T7
28	527685.3	779110	Dwelling	794	T7	00:52:00	09:04:00	13:56:59	T2, T6, T7
29	529931.1	777522.3	Dwelling	799	T5	00:51:00	21:50:00	11:12:13	T3, T4, T5
30	529833.1	778502.1	Dwelling	799	T4	00:40:00	03:44:00	18:30:45	T3, T4, T5, T6
31	528313	779455	Dwelling	813	T7	00:00:00	00:00:00	00:00:00	N/A
32	529918.2	778234.1	Dwelling	819	T4	00:39:00	14:50:00	15:21:33	T3, T4, T5, T6
33	529919.9	778282.8	Dwelling	825	T4	00:38:00	13:41:00	15:04:41	T3, T4, T5, T6
34	529949.7	777478.9	Dwelling	831	T5	00:47:00	15:42:00	09:42:16	T3, T4, T5
35	528227.1	779505.3	Dwelling	869	T7	00:00:00	00:00:00	00:00:00	N/A
36	529878.4	778573.2	Dwelling	870	T4	00:37:00	17:42:00	16:03:36	T3, T4, T5, T6
37	528379.6	776991.9	Dwelling	872	T1	00:00:00	00:00:00	00:00:00	N/A
38	529413.8	776934.7	Dwelling	876	T5	00:00:00	00:00:00	00:00:00	N/A
39	529978.2	777375.3	Dwelling	899	T5	00:39:00	19:44:00	10:41:25	T3, T5
40	528330.3	776964.6	Dwelling	896	T1	00:00:00	00:00:00	00:00:00	N/A
41	527492.9	777467.6	Dwelling	903	T1	00:42:00	04:34:00	12:50:59	T1, T2
42	529220.7	779213.7	Dwelling	905	T6	00:56:00	23:55:00	11:42:47	T2, T6, T7
43	529473.3	776906.5	Dwelling	921	T5	00:00:00	00:00:00	00:00:00	N/A
44	528395.2	776939	Dwelling	926	T1	00:00:00	00:00:00	00:00:00	N/A
45	529239.3	779235.5	Dwelling	933	T6	00:52:00	19:23:00	10:36:17	T2, T6, T7
46	527489.6	777398.2	Dwelling	938	T1	00:37:00	15:22:00	09:37:23	T1
47	527411	777535.6	Dwelling	952	T1	00:35:00	02:32:00	12:21:09	T1, T2

48	530006.8	777264	Dwelling	978	T5	00:35:00	12:10:00	08:50:27	T5
49	527397.1	778225.8	Dwelling	980	T1	00:33:00	05:19:00	13:01:59	T1, T2, T7
50	528592.4	776913.4	Dwelling	990	T1	00:00:00	00:00:00	00:00:00	N/A
51	528356	779644	Dwelling	1002	T7	00:00:00	00:00:00	00:00:00	N/A
52	528513	776860	Dwelling	1022	T1	00:00:00	00:00:00	00:00:00	N/A
53	528540	776844	Dwelling	1043	T1	00:00:00	00:00:00	00:00:00	N/A
54	527757	776972	Dwelling	1045	T1	00:00:00	00:00:00	00:00:00	N/A
55	530061	777195	Dwelling	1061	T5	00:32:00	04:41:00	07:00:41	T5
56	528565	776815	Dwelling	1077	T1	00:00:00	00:00:00	00:00:00	N/A
57	529301	779370	Dwelling	1080	T6	00:27:00	12:14:00	02:59:25	T7
58	527912	779652	Dwelling	1091	T7	00:00:00	00:00:00	00:00:00	N/A
59	527427	777210	Dwelling	1094	T1	00:16:00	07:08:00	01:44:37	T1
60	528341	779748	Dwelling	1106	T7	00:00:00	00:00:00	00:00:00	N/A
61	527404	777174	Dwelling	1134	T1	00:11:00	03:52:00	00:56:43	T1
62	528452	779774	Dwelling	1139	T7	00:00:00	00:00:00	00:00:00	N/A
63	530097	777086	Dwelling	1153	T5	00:22:00	12:23:00	03:01:37	T5
64	527555	776982	Dwelling	1156	T1	00:00:00	00:00:00	00:00:00	N/A
65	530124	778747	Dwelling	1169	T4	00:27:00	03:08:00	06:37:57	T4, T5
66	527544	776959	Dwelling	1181	T1	00:00:00	00:00:00	00:00:00	N/A
67	527396	777101	Dwelling	1186	T1	00:00:00	00:00:00	00:00:00	N/A
68	528503	779816	Dwelling	1187	T7	00:00:00	00:00:00	00:00:00	N/A
69	529145	776591	Dwelling	1187	T5	00:00:00	00:00:00	00:00:00	N/A
70	529234	779524	Dwelling	1191	T6	00:27:00	16:47:00	04:06:09	T7
71	530348	778046	Dwelling	1204	T5	00:25:00	15:20:00	03:44:53	T4, T5
72	527386	777065	Dwelling	1216	T1	00:00:00	00:00:00	00:00:00	N/A
73	527584	779607	Dwelling	1217	T7	00:29:00	00:48:00	06:03:44	T7

74	527120	778142	Dwelling	1219	T1	00:26:00	03:19:00	06:40:39	T1, T2, T7
75	527534	776901	Dwelling	1232	T1	00:00:00	00:00:00	00:00:00	N/A
76	530080	778977	Dwelling	1262	T4	00:25:00	10:59:00	02:41:05	T4
77	527881	776662	Dwelling	1272	T1	00:00:00	00:00:00	00:00:00	N/A
78	529190	776502	Dwelling	1276	T5	00:00:00	00:00:00	00:00:00	N/A
79	527102	779029	Dwelling	1284	T7	00:24:00	08:11:00	02:00:01	T7
80	529227	776485	Dwelling	1294	T5	00:00:00	00:00:00	00:00:00	N/A
81	530151	776926	Dwelling	1296	T5	00:00:00	00:00:00	00:00:00	N/A
82	529275	776452	Dwelling	1329	T5	00:00:00	00:00:00	00:00:00	N/A
83	530102	779062	Dwelling	1333	T4	00:24:00	10:51:00	02:39:08	T4
84	527031	778967	Dwelling	1336	T7	00:23:00	07:12:00	01:45:36	T7
85	527049	777375	Dwelling	1348	T1	00:24:00	11:12:00	02:44:16	T1
86	527916	776550	Dwelling	1367	T1	00:00:00	00:00:00	00:00:00	N/A
87	526972	778920	Dwelling	1383	T7	00:00:00	00:00:00	00:00:00	N/A
329	529620.8	778721.7	Derelict	750	T4	00:52:00	13:58:00	21:00:51	T2, T3, T4, T6, T7
330	529112.5	779015.5	Derelict	679	T6	01:23:00	07:49:00	01:22:39	T2, T6, T7
332	530497.1	777927.2	Derelict	1331	T5	00:21:00	05:48:00	01:25:04	T5

5.4.2 Cumulative Shadow Flicker

There are no existing, permitted, or proposed wind farms within 5km of the proposed turbines. Therefore, there is no potential for cumulative shadow flicker effects to occur and no potential for cumulative shadow flicker effects.

The nearest operational wind farm to the site is the Mace Upper Wind Farm (MCC. Pl. Ref. 062476) which is located approximately 7.5km to the northeast of the Site. Due to the separation distance between the proposed turbines and all surrounding proposed, permitted, or operational wind farms (i.e., when applying a 10x rotor diameter study area to all other wind farms within 5km, the respective study areas do not overlap with the Study Area), there is no potential cumulative shadow flicker effects.

5.5 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 Proposed Project.

The Environmental Protection Agency (EPA) published its *'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, 2022)* in May 2022, which is intended to guide practitioners preparing an EIAR, this is further discussed in Section 1.2.1 of Chapter 1. This section has been prepared in line with the guidance provided within this document.

Within this section, the impact will consider the Proposed Project i.e. the Proposed Wind Farm and the Proposed Grid Connection, as a whole.

5.5.1 'Do-Nothing' Scenario

If the Proposed Project were not to proceed, the Site will continue to function as it does at present, with no changes made to the current land-use and potential for impacts on population and human health through the construction, operation and decommissioning of the Proposed Project would not occur.

If the Proposed Project were not to proceed, the opportunity to capture part of County Mayo's valuable renewable energy resource would be lost, as would the opportunity to contribute to meeting Government and EU targets for the production and consumption of electricity from renewable resources by 2030 and the reduction of greenhouse gas emissions. The opportunity to generate local employment and investment and to diversify the local economy would also be lost.

Furthermore, as this application includes a Biodiversity Management and Enhancement Plan (Appendix 6-4) to be implemented during the development's operation, the opportunity to enhance the Site for biodiversity, at a local scale, would also be lost.

5.5.2 Construction Phase

5.5.2.1 Population

5.5.2.1.1 *Population Levels*

Pre-Mitigation Impacts

Those working on the construction phase of the Proposed Project will travel daily to the Site from the wider area. The construction phase will have no impact 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 Impact

No residual effects.

Significance of Effects

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

5.5.2.1.2 *Employment and Investment*

Pre-Mitigation Impacts

The construction of the Proposed Project will provide employment for technical consultants, contractors and maintenance staff. As discussed, it is proposed to construct the Proposed Wind Farm and Proposed Grid Connection concurrently which would require approximately 100 employees in total, with the majority of these roles focused on the construction phase of the Proposed Wind Farm. The construction phase of the Proposed Project will last between 12-18 months. Many construction workers and materials will be sourced locally, thereby helping to sustain employment in the construction trade. This will have a positive, moderate, short-term, direct effect, which is Not Significant.

The salaries and wages earned by those employed during the construction phase of the Proposed Project 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 positive, slight, short-term, indirect effect on their cash flow, which is Not Significant.

The Proposed Project 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. This will have a long-term slight positive indirect effect. Wind Energy Ireland estimates that there are over 5,000 people employed in roles related to wind energy in Ireland in 2023. This figure is anticipated to grow significantly in the coming years as the need to achieve the targets set out in CAP25 accelerates.

Mitigation and Monitoring Measures

No mitigation required.

Residual Effect

The injection of money in the form of salaries and wages to those employed during the construction phase of the Proposed Project 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 employees, local retailers and businesses experiencing a positive, moderate, short-term effect on their cash flow.

Significance of Effects

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

5.5.2.1.3 *Land Use Patterns & Activities*

Pre-Mitigation Impacts

Current land use within the Site and the wider landscape consists of a mix of pastoral agriculture, peat bogs and private forestry. During the construction phase there may be slight interference with agricultural practices within the EIAR Site Boundary.

Please note, as stated in Ch. 4 Description of the Proposed Project, approximately 0.7ha (hectares) of forestry, comprising conifer plantation (WD4), will be felled as part of the Proposed Project. Whilst there will be a change of land use in these areas to facilitate the Proposed Project, this is an acceptable and unavoidable part of the Proposed Project. Please note, the 0.7ha of conifer plantation to be felled as part of the Proposed Project 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.

There is no potential for effect on residential and commercial land use in the area. There is short-term slight negative effect on existing land-use patterns, which is Not Significant.

Mitigation and Monitoring Measures

The following measures will be adhered for the Proposed Project.

- The identified 0.7ha of commercial forestry that will be felled for the Proposed Project will be replaced or replanted through proposed enhancement measures or on a hectare for hectare basis as a condition of any felling licence that will be issued in respect of the Proposed Wind Farm felling (see Section 4.4.3.3. of Ch. 4 Description of the Proposed Project of this EIAR).

Residual Effects

On a local scale, the residual effect is considered to be a negative, short-term, slight, effect on land use and activities.

Significance of Effects

The effect on land use/activities due to the construction phase of the Proposed Project is Not Significant.

5.5.2.1.4 *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 effect on property values, which is Not Significant, to properties located within 1km of the proposed turbines during the construction phase of the Proposed Project.

Mitigation and Monitoring Measures

- All mitigation relevant to property values, outlined in the corresponding chapters: Chapter 10 Air Quality, Chapter 12 Noise and Vibration, Chapter 13 Landscape and Visual, 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 Proposed Project construction works. Please refer to Chapter 18 Schedule of Mitigation and Monitoring Measures for a full list of measures.

- The Proposed Project 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 Impact

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 Proposed Project.

Significance of Effects

The effect on property values due to the construction of the Proposed Project is Not Significant.

5.5.2.1.5 *Tourism*

Pre-Mitigation Impact

The Proposed Project has some rural aesthetic qualities given the relative lack of buildings and infrastructure present on the Site. It is mostly peatland and pastoral agriculture land, with some areas of forestry; however, these views are common throughout the local area and due to the Site'sintensive agricultural land-use, it is noted that the landscape has been subject to substantial levels of human interference and modification. Views from within the Site are generally contained given the surrounding topography and the treelines and hedgerows present on site. Given that there is no tourist attractions located within or near to the Site, and considering the human interference within the landscape, there is an imperceptible, short-term, negative effect on tourism during the construction phase of the Proposed Project, which is Not Significant.

Mitigation and Monitoring Measures

With regard to tourist attractions and amenity use surrounding the Proposed Project, traffic management safety measures will be in place, where required. Please see Section 5.5.2.2.5 below which outlines the mitigation measures proposed in relation to traffic and Section 15.2 of Chapter 15 Material Assets for mitigation measures relating to the Proposed Project.

Residual Effects

Based on the above, it is concluded that there will be no residual effect on tourism in the wider landscape during the construction phase the Proposed Project.

Significance of Effects

The effect on tourism in the wider landscape due to construction phase the Proposed Project is Not Significant.

5.5.2.1.6 *Residential Amenity*

Pre Mitigation Impact

The potential for effect on residential amenity is discussed in Section 5.3.6 above. There is the potential for effect on residential amenity during the construction phase of the Proposed Project due to air, traffic, noise and vibration emissions from the presence of additional traffic and plant machinery within the Site. It should be noted that there will be no effect on local traffic associated with the Proposed Grid

Connection as it is located within the Site and not along the local road network. Dust, noise and vibration emissions will have a short-term, moderate, negative effect. Traffic will have a short-term moderate negative effect. This is Not Significant.

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 Proposed Project 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 Proposed Project.

Significance of Effects

The effect on residential amenity due to the construction phase of the Proposed Project is Not Significant.

5.5.2.2 Health

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

5.5.2.2.1 *Health and Safety*

Pre-Mitigation Impacts

Construction of the Proposed Project 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. Construction of the Proposed Grid Connection will entail risks including working in proximity to power lines, thus incurring potential health and safety risks for construction workers. This will have a short-term potential significant negative effect on health and safety. This is Not Significant.

Mitigation and Monitoring Measures

The Proposed Project will be constructed, operated and decommissioned 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 (General Application) Regulations 2007 to 2023.

The following measures below are also detailed in Appendix 4-5 Construction and Environment Management Plan and 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 site where uncontrolled access is not permitted.
- Appropriate warning signs will be posted, directing all visitors to the site manager. Appropriate warning measures including 'goalposts' will be used as appropriate to prevent contact with any overheads lines that traverse the site.
- Goal posts will be established, where necessary, under overhead electricity lines for the entirety of the construction phase of the Proposed Project.
- 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 over the site. All staff will be trained to be aware of the risks associated with overhead lines. All contractors that may visit the 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 2013 to 2021"* 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 Proposed Project requires 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*'[41].

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):

[41] *HSA, 2017. 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_.html

- Identify 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;
    - Toolbox talks as necessary;
    - Maintenance of a file which lists personnel on site, their name, nationality, current SafePass 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 there will be a short-term potential, slight, negative residual effect on health and safety during the construction phase of the Proposed Project.

Significance of Effects

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

5.5.2.2.2 *Air Quality: Dust, NO2, PM10 and PM25 and Co2 Emissions*

Pre-Mitigation Impacts

Potential dust and exhaust emission sources during the construction phase of the Proposed Project include upgrading of existing access tracks and public road and construction of new tracks, turbine and meteorological mast foundations, temporary construction compounds, peat and spoil 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 Site also has the potential to create dust, which could affect nearby sensitive receptors. These effects will have a short-term, slight, negative effect on air quality, which is Not Significant. The potential dust impacts that may occur during the construction phase of the Proposed Project are further described in Chapter 10 Air Quality.

Mitigation and Monitoring Measures

Mitigation will be as follows:

- 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.
- All plant and materials vehicles shall be stored in dedicated areas within the Site.
- Turbines and construction vehicles will be transported to the Site on specified haul routes only.
- Grid connection infrastructure will be transported to the Site on specified haul routes only.
- Construction materials for the Proposed Project will be sourced from the onsite borrow and from licenced quarries.
- The agreed haul route roads adjacent to the Site will be regularly inspected for cleanliness and cleaned as necessary.
- All vehicles and machinery which is going to and from the site will be wheel washed as it is being moved to mitigate cross contamination of any ecological material.
- The roads adjacent to the Site entrances will be checked weekly for damage/potholes and repaired as necessary.
- The transport of construction materials around the Site from the on site borrow pit will be covered by tarpaulin where necessary.
- Waste material will be transferred to a licensed /permitted Materials Recovery Facility (MRF) by a fully licensed waste contractor where the waste will be sorted into individual waste streams for recycling, recovery or disposal. The MRF facility will be local to the Site to reduce the amount of emissions associated with vehicle movements.
- A Construction and Environmental Management Plan (CEMP) will be in place throughout the construction phase (see Appendix 4-5).

Residual Effects

With the implementation of the above measures for this construction phase, 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 Proposed Project are considered to be Not Significant.

5.5.2.2.3 *Water Quality*

Pre-Mitigation Impacts

The construction phase ground works and use of plant on site may give rise to the potential release of suspended solids and hydrocarbons into surface and groundwaters.

There are no mapped groundwater source protection areas for Public Water Supplies (PWS) or Group Water Schemes (GWS) in the Site or in the surrounding lands.

The closest GSI mapped source protection area to the Site is associated with the Pollavaddy GWS, located ~5.1km to the north. The next GWSs consist of Mayo Abbey GWS, the Nestor Scheme, the Knockaunakill Mayo Abbey scheme, the Kilcolman Facefield GWS, the Loughanemon Barnacarroll GWS Kilcolman Facefield GWS, the Loughanemon Barnacarroll GWS and the Mayo Abbey GWS.

Any potential effects on local water quality or quantity could potentially affect these water supplies.

It is important to note that the Site does not overlap with the delineated source protection area of any GWS.

Nevertheless, due to the GSI mapped Regionally Important Karst Aquifer which underlies the Site, these GWSs were included for the purposes of a conservative impact assessment. Chapter 9 Water assesses the potential for impact on group water schemes and other public water supplies during the construction phase. Further details on this GWS are provided in Section 9.3.15.2 of this EIAR.

The Site does not fall within the Claremorris urban wastewater treatment catchment.

Should the Proposed Project receive planning permission, the water main located in the north/north west area of the Site, will be diverted as agreed with Uisce Éireann under a diversion agreement.

There are no private wells located within the Site. The pre-mitigation impact on water quality is assessed as a negative, moderate, indirect, long term, unlikely effect on down gradient private water supplies and is Not Significant.

Mitigation and Monitoring Measures

A bespoke drainage design which includes but is not limited to interceptor drains, check dams, swales and ponds will be implemented on the Site, please see Section 4.7 in Chapter 4 for details on the different type of drainage measures to be implemented on the Site. Section 9.4.1 and section 9.5 of 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 18 for a full list of mitigation and monitoring measures for the Proposed Project.

Residual Effects

With the implementation of the drainage design and all mitigation measures listed in Chapter 9 Water (section 9.5.2.and section 9.5.3); separation distances, prevailing geology, topography and groundwater flow directions, it is considered that the there will be an indirect, negative, slight, long-term and unlikely effect on water quality.

Significance of Effects

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

5.5.2.2.4 *Noise and Vibration*

Pre-Mitigation Impacts

There will be an increase in noise levels in the vicinity of the 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 the Site. The noisiest construction activities associated with wind farm development are excavation and concrete pouring of the turbine bases, and the extraction of stone from the borrow pits in the form of rock blasting and rock breaking. Excavation of a turbine base can typically be completed in one to two days however, and the main concrete pours are usually conducted in one continuous pour, which is done within a matter of hours. These effects will be short-term in duration.

The Proposed Grid Connection is located within the footprint of the Site and entirely within private lands, therefore it is considered that the noise impacts from the construction of the Proposed Grid Connection will be negative, imperceptible and short-term.

Construction noise at any given noise sensitive location will be variable throughout the construction of the 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 Proposed Wind Farm are further described in Chapter 12 Noise and Vibration. The predicted pre-mitigation noise effects during the construction of the Proposed Project are assessed as negative, slight and short-term, which is Not Significant.

Mitigation and Monitoring Measures

Best practice measures for noise control will be adhered to on-site during the construction phase of the Proposed Project. Please refer to Chapter 12 Noise and Vibration and Chapter 18 Schedule of Mitigation and Monitoring Measures for a full list of measures.

- No plant used on site will be permitted to cause an on-going public nuisance due to noise.
- The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations.
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract.
- Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers.
- Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use.
- Any plant, such as generators or pumps, which are required to operate outside of general construction hours will be surrounded by an acoustic enclosure or portable screen as appropriate.
- During the course of the construction programme, supervision of the works will include ensuring compliance with the limits detailed in Section 12.7.1 of Chapter 12 using methods outlined in British Standard BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites – Noise.*
- 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 outside of these hours.

Residual Effects

With the implementation of the above mitigation measures, there will be a negative, not significant to slight and short-term residual effect due to noise and vibration arising during the construction phase of the Proposed Project and is therefore Not Significant.

Significance of Effects

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

5.5.2.2.5 *Traffic and Transport*

Pre-Mitigation Impacts

It is proposed that the wind turbine components be delivered to the Site from Port of Galway. The turbine delivery route is as follows;

- The Turbine Delivery Route (TDR) will travel northeast through Galway City along the L5056 and L5048 Local Roads, followed by the R339 Regional Road. It will then travel along the L5034 before reaching the R336.
- The TDR route will then enter the N6 National Road at the Bothar na dTreabh/Tuam Road junction (c.3.3 km).
- The delivery vehicles transporting the abnormally sized loads will continue east along the N6/M6 Motorway for approximately 15km, before merging onto the M17 at the M6/M17/M18 intersection.
- From here, the delivery vehicles will continue north on the M17 and N17 Tuam bypass and the N17 for approximately 55 km before turning west off the N17 to the north of Claremorris onto the L55512.
- The route then travels northwest on the L55512 for approximately 0.7 km to the junction with the L1519 when the route then travels south on the L1519 and the R331 for approximately 2.2km
- At this point the route heads west on the L1506 for approximately 2.8 km before continuing northwest on the L1505 for approximately 3.6 km.
- At this point the route turns right via the temporary construction site entrance and on to the L15053 and continues northeast for approximately 0.2 km before turning left onto the L15053 and into the Site.

The proposed route is described in further detail in Ch. 4 Description of the Proposed Project of this EIAR and Ch. 15 Material Assets. Non-turbine construction traffic e.g., Heavy Goods Vehicles (HGVs) and Light Goods Vehicles (LGVs) movements involved in the delivery of construction related materials to the Site will also enter via the temporary construction site entrance on the L1505.

There will be no impact on traffic or transport during the construction of the Proposed Grid Connection, as it will be located entirely off the public road corridor within the confines of the Site.

This will have a short-term, slight, negative effect on traffic users on the delivery routes which is Not Significant.

This will be minimised with the implementation of the mitigation measures included in the proposed traffic management plan.

Mitigation and Monitoring Measures

A complete Traffic and Transport Assessment (TTA) of the Proposed Project 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 Proposed Project 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 Proposed Project. 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. Locals in the area will be informed of any upcoming traffic related matters e.g. delivery of turbine components at night, via letter drops and posters in public places. Information will include the contact details of the Contract Project Co-Ordinator, who will be the main point of contact for all queries from the public or local authority during normal working hours. An "out of hours" emergency number will also be provided. The delivery of large wind turbine components at night in order to minimise disruption to general traffic during the construction stage. 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 a traffic management plan is implemented for the construction phase of the Proposed Project, there will be a slight, short-term, negative residual effect on local road users.

Significance of Effects

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

5.5.2.2.6 *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 Proposed Project. Seven risks (Critical Infrastructure Emergencies, Severe Weather, Flooding, Peat Stability, Traffic Incident, Contamination, Fire/Gas Explosion, and Collapse/ Damage) 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 scenarios with the highest risk score in terms of the occurrence of major accident and/or disaster during the construction are identified as 'Contamination' of the Site, 'Peat Stability' risks on site and risk of 'Fire/Explosion' during construction. Therefore, in the absence of mitigation, the impact of both contamination and major fires are unlikely, temporary, moderate, negative effects, and are Not Significant.

Mitigation and Monitoring Measures

- The Proposed Project will be designed and built in line with current best practice and, as such, mitigation against the risk of major accidents and/or disasters will be embedded through the design. In accordance with the provision of the European Commission '*Guidance on the preparation of Environmental Impact Assessment Reports'* 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 Proposed Project and is included in Appendix 4-5 of this EIAR. Upon a grant of planning permission for the Proposed Project, 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 4-5 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 Water. 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.
- The Proposed Project 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 Proposed Project.

Residual Effects

The impact assessment concludes that the risk of a major accident and/or disaster during the construction phase of the Proposed Project is considered 'low' in accordance with the '*Guide to Risk Assessment in Major Emergency Management'* (DoEHLG, 2010). It is considered that when the mitigation and monitoring measures outlined in the CEMP (Appendix 4-5) are implemented there will be an unlikely, temporary, slight, negative, residual effect associated with the construction of the Proposed Project.

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 Proposed Project is Not Significant.

5.5.2.2.7 *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 5.3.10 above, can only occur during the operational phase of a wind energy development. Therefore, there are no shadow flicker impacts associated with the construction phase of the Proposed Project. Any shadow flicker effects that occur in the operational phase of the proposed turbines will be mitigated in order to comply with the Guidelines (DoEHLG, 2006).

5.5.3 Operational Phase

5.5.3.1 Population

The effects set out below relate to the operational phase of the Proposed Project.

5.5.3.1.1 *Population Levels*

Pre-Mitigation Impacts

The operational phase of the Proposed Project will only require 2-3 workers onsite daily for the functioning of the Proposed Wind Farm and the Proposed Grid Connection. The operational phase of

the Proposed Project 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

The effect on population levels during the operational phase of the Proposed Project are Not Significant.

5.5.3.1.2 *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 Proposed Project. On a long-term scale, the Proposed Project will create approximately 2-3 jobs during the operational phase relating to the maintenance and control of the Proposed Project, having a long-term, slight, positive effect, which is Not Significant.

Rates payments for the Proposed Project will contribute significant funds to Mayo 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, which is Not Significant.

The injection of funding in the form of Community Benefit. Based on the current Renewable Energy Support Scheme (RESS) guidelines it is expected that for each megawatt hour (MWh) of electricity produced by the wind farm, the project will contribute €2.1 million into a community fund for the first 15 years of operation of the Proposed Project.

Should the Proposed Project be developed under the current RESS T&C's, as a MW development it would attract a community contribution in the region of almost €145,000/year for the local community (estimated based on an average energy yield). The value of this fund would be directly proportional to the electricity generated by the wind farm. Under the current RESS T&Cs, the following is the recommended breakdown of the fund:

- Direct payments – to those living closest to the Proposed Wind Farm. A minimum €1,000 payment per annum for houses within 1km of the Proposed Project.
- Support for local groups – A minimum of 40% per year would be available for local groups, clubs and not for profit organisations that provide services in the local area. This would include services for the elderly, local community buildings, and the development of sporting facilities such as all-weather playing pitches etc.
- Administration costs – a maximum of 10% per year will be made available for the administration and governance costs of the fund.

- Energy Efficiency – The remaining balance of this community benefit fund would be available for the development of energy initiatives to benefit people living in the local area. This is to be provided to not-for-profit community enterprises each year.

A locally elected committee will administer the fund. The Community Benefit Fund belongs to the local community. The premise of the fund is that it should be used to bring about, significant, positive change in the local area. To make this happen, the first task will be to form a benefit fund development working group that clearly represents both the close neighbours to the project as well as nearby communities. The group will then work on designing the governance and structure of a community entity that would administer the Community Benefit Fund.

Mitigation and Monitoring Measures

No mitigation required.

Residual Effects

During the operational phase of the Proposed Project there will be positive, slight, long-term residual effect on employment and investment.

Significance of Effects

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

5.5.3.1.3 *Land use Patterns and Activities*

Pre-Mitigation Impacts

The permanent footprint of the Proposed Project will occupy only a small percentage of the Site; 5.5ha (3%) of the overall 165 hectare Site. Farming practices will not be impacted during the operational phase. The addition of new tracks throughout the Site will enable access for landowners throughout their lands. This will have a long-term, imperceptible, positive, direct impact on land use, and is Not Significant.

As detailed in the BMEP (Appendix 6-4) native woodland will be planted within the identified biodiversity enhancement areas (Figure 3-1 in Appendix 6-4), with hedgerow/ treeline planting and enhancement also being proposed. There is also an area proposed for enhancement of 1.16 ha of Molinia Meadow habitat. There is an extensive network of existing linear landscape features in the wider area that will be retained, and the proposed planting will enhance connectivity for bats across the Site and wider landscape. This will have a long-term, slight, positive, direct impact on land use, and is Not Significant.

The small scale of the underground cabling located entirely within private land, and its ability to coexist with ongoing site activities and activities within the landscape indicate that the Proposed Project infrastructure will have no significant impact on other land-uses within the Site and the wider area. This will have a long-term, imperceptible, negative direct effect, and is Not Significant.

Mitigation and Monitoring Measures

No mitigation required.

Residual Effects

Due to the small permanent footprint of the Proposed Project infrastructure on a site scale and even more so on a local scale, the residual impact is considered a long-term, imperceptible, positive, direct 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 Proposed Project will be Not Significant.

5.5.3.1.4 *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 Proposed Project. 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, there is the potential for negative, slight, long-term impacts on property values, which is Not Significant, located within 1 km of the proposed turbines during the early operational phase of the Proposed Project.

Mitigation and Monitoring Measures

- All mitigation relevant to property values are discussed in their corresponding chapters: Chapter 10 Air Quality, Chapter 12 Noise and Vibration, Chapter 13 Landscape and Visual, 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 Proposed Wind Farm construction works.
- The Proposed Project 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 negative, imperceptible, short-term residual effect on property values from the operational phase of the Proposed Project.

Significance of Effects

The effect on property values due to the Proposed Project is Not Significant.

5.5.3.1.5 *Tourism*

Pre-Mitigation Effect

There are no tourism attractions within or adjacent to the Site that could be affected by the operation of the Proposed Project. The nearest tourist attraction to the Proposed Project is the Land of the Giants at McMahon Park, Clare Lake, Claremorris, Co. Mayo, located c. 5.5km southwest of the Site.

There will be no theoretical or actual visibility of the Proposed Wind Farm from this location, as outlined in Chapter 13.

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. Considering the human interference there is potential for a negative, slight, long-term effect on tourism, which is Not Significant, during the operational phase of the Proposed Project.

Mitigation and Monitoring Measures

No mitigation required.

Residual Effects

It is considered that the Proposed Project will have a negative, slight, long-term, residual effect of visitor experience to attractions in the wider landscape.

Significance of Effects

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

5.5.3.1.6 *Residential Amenity*

Pre-Mitigation Effects

Potential impacts on residential amenity during the operational phase of the Proposed Project 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 Proposed Project will be capable of meeting all required guideline limits in relation to noise and the shadow flicker set out in the Guidelines (DoEHLG, 2006). The noise and vibration assessment is detailed in Chapter 12 of this EIAR. It should be noted that the Proposed Project will comply with the noise thresholds imposed on the development by the consenting authority should permission be granted for the Proposed Project. The visual impact of the Proposed Wind Farm is addressed in Chapter 13 Landscape and Visual. The turbine locations have been designed to maximise turbine separation distances to dwellings in the area.

The Proposed Grid Connection is located within private lands, the cabling route is located underground; therefore, no residential amenity effects are deemed to arise from this element.

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 proposed turbines. Full details are provided in Section 2.7 of the EIAR (in Chapter 2 Background to the Proposed Project) and Section 15.2 of the EIAR (in Chapter 15 Material Assets – Telecoms and Aviation). Copies of scoping replies received are presented in Appendix 2-1 of the EIAR. The Proposed Project will have no impact on telecommunications.

It is considered that there will be a long-term, moderate, negative effect on residential amenity as a result of the Proposed Project which is considered Not Significant.

Mitigation and Monitoring Measures

All mitigation as outlined under noise and vibration, dust, traffic, visual amenity and shadow flicker, 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 Proposed Project 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 impact is considered to be a long-term, slight, negative, residual impact on residential amenity.

Significance of Effects

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

5.5.3.2 Health

5.5.3.2.1 *Health and Safety*

Pre-Mitigation Effect

Rigorous safety checks and continued maintenance are conducted on the turbines and ancillary infrastructure during operational phase to ensure there are no health and safety risks posed by the Proposed Project. This will have a potential long-term, slight, negative impact on health and safety during the operational phase and is Not Significant.

Mitigation and Monitoring Measures

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

- 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 Proposed Project 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 proposed onsite 110kV substation, which will be operated by ESBN will be locked and fenced off from public access. The substation will be operational remotely and manually 24 hours per day, 7 days a week. Supervisory operational and monitoring activities will be carried out remotely using a SCADA system, with the aid of computers connected via a telephone modem link.
- Periodic service and maintenance work which include some vehicle movement.
- For operational and inspection purposes, substation access is required.
- 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, imperceptible negative residual impact on health and safety during the operational life of the Proposed Project.

Significance of Effects

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

5.5.3.2.2 *Air Quality: Dust, NO_2, PM_{10} and PM_{25} and CO2 Emissions*

Pre-Mitigation Effect

The sources of dust and other emissions generated during the operational phase will be from infrequent visits by maintenance staff in light good vehicles (LGVs) approximately one or two visits per day. This will have a potential long-term, imperceptible negative impact on health during the operational phase. Over the envisaged 35-year lifespan of the Proposed Project it is expected to effectively reduce carbon dioxide emissions that would have occurred if the same energy was generated by traditional fossil fuel plants. This is a long-term, moderate, positive effect on air quality and is Not Significant.

Mitigation and Monitoring Measures

No mitigation required.

Residual Impacts

Impacts from dust and other emissions to air from the maintenance of the Proposed Project on sensitive receptors during the operational phase of the Proposed Project 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 Proposed Project, 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 Proposed Project is considered to have No Significant effects on air quality.

5.5.3.2.3 *Water Quality*

Pre-Mitigation Impact

During the operational phase of the Proposed Project, 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 site entrances, access tracks 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 effect on human health due to a potential deterioration of water quality and is Not Significant.

Mitigation and Monitoring Measures

The mitigation measures detailed in Chapter 9 Water will ensure all surface water runoff from upgraded roads (including hardstand and turbine base areas) will be captured and treated prior to discharge/release. Settlement ponds, checks dams and buffered outfalls will prevent roads acting as preferential flow paths by providing attenuation and water quality treatment. Please see Chapter 9 for details. The full list of mitigation and monitoring measures for the Proposed Project are detailed in Chapter 18.

Residual Impacts

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.

5.5.3.2.4 *Noise and Vibration*

Pre-Mitigation Effect

An assessment of the operational wind turbine noise levels has been undertaken in accordance with best practice guidelines and procedures as outlined in Chapter 12 Noise and Vibration. The predicted noise levels associated with the Proposed Project will be within best practice noise criteria curves recommended in the Guidelines (DoEHLG, 2006). The level of noise from the Proposed Grid Connection underground cabling route will be negligible. . The grid cabling is not located along the public road corridor and as such very few residential receptors are exposed to the noise. Therefore, it is considered that there will be a long term, not significant, negative effect due to noise and this is Not Significant.

Mitigation and Monitoring Measures

Please see Chapter 12, Section 12.6 for noise and vibration mitigation and monitoring proposals for the Proposed Project. Please refer to Chapter 18 Schedule of Mitigation and Monitoring Measures for a full list of mitigation and monitoring measures for the Proposed Project.

Residual Effects

The predicted residual operational turbine noise effects at the closest noise sensitive locations are not significant. 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, and site roads can be satisfied. The effects are considered Not Significant.

5.5.3.2.5 *Traffic and Transport*

Pre-Mitigation Effect

Major component failures are considered unlikely with the implementation of normal operational and maintenance activities and therefore the presence of Heavy Good Vehicles (HGVs) at the Site is considered extremely rare until the decommissioning phase begins. All Site visits for maintenance and inspection purposes will be done via Light Goods Vehicles (LGVs) with just one or two visits per day.

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

Pre-mitigation impacts are considered negative, imperceptible, long term on existing road users, which is Not Significant.

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 Impacts

No residual effects.

Significance of Effects

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

5.5.3.2.6 *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 Proposed Wind Farm. 6 risks (Severe Weather, Flooding, Contamination, and Fire/Gas Explosion, Collapse/ damage to structures, Critical Infrastructure Emergencies and Traffic Incident) 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 scenario with the highest risk score in terms of the occurrence of major accident and/or disaster during operation is identified as 'Fire/Explosion' during operation. Therefore, in the absence of mitigation, the impact of major fires is considered unlikely, temporary, moderate, negative effects, and Not Significant.

Mitigation and Monitoring Measures

- The Proposed Project will be designed and built in line with current best practice and, as such, mitigation against the risk of major accidents and/or disasters will be embedded through the design. In accordance with the provision of the European Commission '*Guidance on the preparation of Environmental Impact Assessment Reports'* 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 Proposed Project 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 Proposed Project.

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 Proposed Project is considered 'low' in accordance with the '*Guide to Risk Assessment in Major Emergency Management'* (DoEHLG, 2010). It is considered that when the mitigation and monitoring measures outlined in the CEMP (Appendix 4-5) are implemented and adhered to, the residual effects associated with the operation of Proposed Project will be unlikely, temporary, negative and slight.

Significance of Effects

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

5.5.3.2.7 *Shadow Flicker*

Pre-Mitigation Impacts

Proposed Wind Farm

As stated in Section 5.3.6 there are 90 no. sensitive receptors located within 1.36km of the Proposed Turbines. A total of 40 sensitive receptors, may experience daily shadow flicker in excess of the Guidelines (DoEHLG, 2006) which recommend that a dwelling should not experience shadow flicker exceeding a total of 30 hours per year or 30 minutes per day. However, the prediction modelling does not take vegetation screening, screening by adjacent buildings or extant window orientation into account. Therefore, in reality, shadow flicker occurrences may be less than predicted. 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 process outlined in Mitigation and Monitoring will be implemented. Should the Draft Guidelines (DoHPLG, 2019) be implemented whilst this application is being processed the proposed turbines can be brought in line with the requirements of the Draft Guidelines (DoHPLG, 2019).

Relying on the prediction modelling alone, shadow flicker could potentially have a long-term, slight, negative impact on each sensitive receptor, which is not significant.

Proposed Grid Connection

There is no potential for the Proposed Grid Connection infrastructure to cause shadow flicker, and so no effect is predicted.

Mitigation and Monitoring Measures

Mitigation will be required where daily or annual shadow flicker exceedances occur.

Wind Turbine Control Measures

Shadow flicker control models (SFCMs), consisting of light sensors and specialised software, will be installed on each of the wind turbines. The control system will calculate, in real-time:

- Whether shadow flicker has the potential to effect nearby sensitive receptors, based on pre-programmed co-ordinates for the sensitive receptors and turbines;
- Wind speed (can affect how fast the turbine will turn and how quickly the flicker will occur);
- Wind direction; and
- The intensity of the sunlight.

When the control system detects that the sunlight is strong enough to cast a shadow, and the shadow falls on a sensitive receptor or sensitive receptors, then the turbine will automatically shut down; and will restart when the potential for shadow flicker ceases at the effected sensitive receptors. Such systems are common in many wind farm developments. This method of shadow flicker mitigation has been technically well-proven, and the technology has been well established.

Table 5-9 contains all calculated shadow flicker results at each sensitive receptor. The SFCMs will automatically curtail turbine operation during predicted shadow flicker events—based on sun angle, turbine position, and time of day, thereby eliminating shadow flicker at all affected receptors, allowing for a short period of time for the rotor to come to a stop.

This proposed method of mitigation will be implemented to mitigate shadow flicker effects at all sensitive receptors within the study area.

In the event that complaints of shadow flicker are received by the Applicant / site operator or by Mayo County Council, the Applicant will conduct an investigation, and the complaints frequency, duration and time of complaints will be considered, and the specialist modelling software will be used to confirm the occurrence(s). Should the complaint persist, a shadow flicker survey involving the collection of light data will also be carried out at the sensitive receptor in which the complaint was made. Further refinement of the shadow flicker control system will be conducted to fully mitigate negative shadow flicker occurrence.

It is therefore considered that the Proposed Project will comply with the Guidelines (DoEHLG, 2006) and if adopted during the course of the planning process, the same control system can meet the requirements of the Draft Guidelines (DoHPLG, 2019). The Proposed Project is therefore not only compliant under current policy but also future-proofed for alignment with forthcoming regulatory changes.

Residual Effect

With the benefit of the mitigation measures outlined in this section, any turbine to be installed onsite will be able to comply with the Guidelines (DoEHLG, 2006). This will result in an imperceptible, long-term, residual effect from shadow flicker on human health.

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.

5.5.4 Decommissioning Phase

The wind turbines proposed as part of the Proposed Project are expected to have a lifespan of approximately 35 years. Following the end of their useful life, the wind turbines may be replaced with a new set of turbines, subject to planning permission being obtained, or the proposed turbines may be decommissioned fully.

The Proposed Grid Connection and on-site substation will remain in place as it will form part of the national electricity grid under the control of ESBN.

The works required during the decommissioning phase are described in Section 4.11 in Chapter 4 Description of the Proposed Project. 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 Proposed Project. The mitigation and management measures that will inform the final decommissioning plan are contained in the CEMP in Appendix 4-5. There will be No Significant effects associated with the Decommissioning Phase.

5.6 Cumulative and in Combination Effects

For the assessment of cumulative effects, any other existing, permitted or proposed projects (wind energy or otherwise) have been considered. The potential cumulative effects of the Proposed Wind Farm, Proposed Grid Connection (together forming the Proposed Project) and other relevant developments has been carried out with the purpose of identifying what influence the Proposed Project will have on the surrounding environment when considered cumulatively. Further information on projects considered as part of the cumulative assessment are given in Section 2.9 of Chapter 2 Background to the Proposed Project. 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.

5.6.1.1 Employment and Economic Activity

Cumulative projects within 20 kilometres of the Proposed Project 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.

5.6.1.2 Tourism and Amenity

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

It is not considered that the Proposed Project together with other projects in the area will cumulatively affect any tourism infrastructure in the wider area. As also noted in Section 5.3.2 above, the conclusions

from available research indicate there is a generally positive disposition among tourists towards wind development in Ireland.

Given the Proposed Project's relative isolation and remoteness, it is considered that the Proposed Project will support the development of the wider area, attracting local and new visitors to the area which could be uncovered as part of a wider regional strategy.

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

5.6.1.3 Traffic

Construction of the Proposed Project at the same time as cumulative projects located in the surrounding area has the potential to give rise to cumulative impacts on traffic. There are no permitted wind farm developments within 5km of the proposed turbines. The nearest proposed wind farm to the Proposed Project is an 11 no. turbine Shancloon Wind Farm in Beagh, Co. Galway. Shancloon Wind Farm is proposed to be approximately 20km southeast from the Proposed Project and has been submitted to An Coimisiún Pleanála. Cumulatively, both projects have the potential to incur short term negative effects during construction phases. 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 are implemented during the construction phase of the Proposed Project, there will be no significant cumulative negative effect on air quality. It is unlikely that constructions vehicles from this development will cause any cumulative impact with the Proposed Project. Development to the nearby overhead line consist of the refurbishment to the Castlebar-Cloon 110kV overhead line (Planning Reference 221030), which is 0.42km northwest of the Site. During construction of the proposed refurbishment work, there may be a slight cumulative impact of traffic with the Proposed Project. The mitigation measures in relation to traffic set out in Section 15.1.11 will ensure that any cumulative effects that arise will be short term in duration and imperceptible in significance.

5.6.1.4 Air (Dust)

The nature of the Proposed Project is such that, once operational, it will have a long-term, moderate, positive effect on the air quality. The nearest wind farm in the vicinity of the proposed turbines is the 3-no. turbine Mace Upper Wind Farm which is approximately 7.5 km to the northeast of the Site. When the Proposed Project is in operational phase both Mace Upper Wind Farm and Cunlaghfadda Green Energy Project cumulatively have the potential to have a long term, positive effects on air quality climate in the region. This is done by reducing reliance on and use of non-renewable energy sources and providing a sustainable alternative.

During the construction phase of the Proposed Project and the construction phase of other developments within 20 kilometres of the 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 are implemented during the construction phase of the Proposed Project, there will be no significant cumulative negative effect on air quality.

The nature of the Proposed Project 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.

5.6.1.5 Health and Safety

The Proposed Project 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 Proposed Project and other developments in the area.

5.6.1.6 Property Values

As noted in Section 5.5.3.1.4 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. 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.

5.6.1.7 Services

The rate payments from the Proposed Project and other projects in the area will contribute significant funds to Mayo 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.

5.6.1.8 Shadow Flicker

As outlined above, no dwellings will be impacted by shadow flicker from the Proposed Project in combination with other existing, permitted, or proposed wind farms.

5.6.1.9 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 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 Proposed Project 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 Proposed Project 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 on residential amenity.

Significance of Effects

Based on the assessment above there will be No Significant direct or indirect effects.

5.7 Summary

Following consideration of the residual effects (post-mitigation) it is noted that the Proposed Project will not result in any significant effects on human beings in the area surrounding the Proposed Project. Following appropriate mitigation, the Guidelines (DoEHLG 2006) shadow flicker limits will not be exceeded at any property. It is noted that the Proposed Project can be brought in line with the requirements of the Draft Guidelines (DoHPLG, 2019), should they be adopted while this application is in the planning system, through the implementation alteration of the mitigation measures outlined.

Provided that the Proposed Project is constructed, operated and decommissioned in accordance with the design, best practice and mitigation that is described within this EIAR, significant effects on population and human health employment and economic activity, land-use, residential amenity, community facilities and services, tourism, property values and health and safety are not anticipated at international, national or county scale.

5.8 EIA Classification Summary

Please see Table 5-11 below for a summary of all identified impacts for the Proposed Project relating to population and human health.

Table 5-1 Impact Assessment Classification Summary

Topic	Pre-Mitigation Effect	Mitigation Section Reference	Residual Effect	Significance
Construction Phase				
Population Levels	No identified impacts	Section 5.5.2.1.1.– No mitigation required	No identified impacts	Not Significant
Employment and Investment	Short-term, Moderate, Positive	Section 5.5.2.1.2.– No mitigation required	Short-term, Moderate, Positive	Not Significant
Land Use Patterns & Activities	Short-Term, Slight, Negative	Section 5.5.2.1.3	Short-Term, Slight, Negative	Not Significant

Property Values	Short-Term, Slight, Negative	Section 5.5.2.1.4	Short-Term, Imperceptible, Negative	Not Significant
Tourism	Short-Term, Imperceptible, Negative	Section 5.5.2.1.5	No residual effect	Not Significant
Residential Amenity	Short-Term, Moderate, Negative	Section 5.5.2.1.6	Short-Term, Slight, Negative	Not Significant
Health & Safety	Short-term, Significant, Negative	Section 5.5.2.2.1	Short-Term, Slight, Negative	Not Significant
Air Quality: Dust and Exhaust Emissions	Short-Term, Slight, Negative	Section 5.5.2.2.2	Short-Term, Imperceptible, Negative	Not Significant
Water Quality	Negative, Moderate, Indirect, Long Term, Unlikely	Section 5.5.2.2.3	Indirect, Negative, Slight, Long-Term And Unlikely	Not Significant
Noise and Vibration	Short-Term, Slight, Negative	Section 5.5.2.2.4	Short-Term, Not Significant to Slight, Negative	Not Significant
Traffic and Transport	Short-term, Slight, Negative	Section 5.4.2.2.5	Short-term, Slight, Negative	Not Significant
Major Accidents and Natural Disasters	Unlikely, Temporary, Moderate, Negative	Section 5.4.2.2.6	Unlikely, Temporary, Slight, Negative	Not Significant
Shadow Flicker	N/A	N/A	N/A	N/A
Operational Phase				
Population Levels	No identified impacts	N/A	No identified impacts	Not Significant
Employment and Investment	Long-Term, Slight, Positive	Section 5.5.3.1.2 – No mitigation required	Long-Term, Slight, Positive	Not Significant
Land Use Patterns and Activities	Long-Term, Imperceptible, Positive, Direct	Section 5.5.3.1.3 – No mitigation required	Long-Term, Imperceptible, Positive, Direct	Not Significant

Property Values	Negative, Slight, Long-Term	Section 5.5.3.1.4	Short-Term, Imperceptible, Negative	Not Significant
Tourism	Long-term, Slight, Negative	Section 5.5.3.1.5	Long-Term, slight, Negative	Not Significant
Residential Amenity	Long-Term, Moderate, Negative	Section 5.5.3.1.6	Long-Term, Slight, Negative	Not Significant
Health and Safety	Long-term, Slight, Negative	Section 5.5.3.2.1	Long-Term, Imperceptible, Negative	Not Significant
Air Quality; Dust and Exhaust Emissions	Long-Term, Moderate, Positive	Section 5.5.3.2.2	Long-Term, Moderate, Positive	Not Significant
Water Quality	Negative, Slight, Indirect, Temporary, Unlikely	Section 5.5.3.2.3	Negative, Imperceptible, Indirect, Temporary, And Unlikely.	Not Significant
Noise and Vibration	Long-Term, Not Significant, Negative	Section 5.5.3.2.4	Long-Term, Not Significant, Negative	Not Significant
Traffic and Transport	Long-Term, Imperceptible, Negative	Section 5.5.3.2.5	No Residual Effect	Not Significant
Major Accidents and Natural Disasters	Unlikely, Temporary, Moderate, Negative Effects, and Not Significant.	Section 5.5.3.2.6	Unlikely, Temporary, Slight, Negative	Not Significant
Shadow Flicker	Long-Term, Slight, Negative	Section 5.5.3.2.7	No Residual Effect	Not Significant
Decommissioning Phase				
Population and Human Health	Any impact and consequential effect that occurs during the decommissioning phase will be similar to that	Section 5.4.4	N/A	N/A

	which occurs during the construction phase, however to a lesser extent and lesser duration, and the mitigation measures outlined in Section 5.8.2 will be implemented during the decommissioning phase also			