

Chapter 5 Population and Human Health

Slieveacurry Renewable
Energy Development,
Co. Clare

Environmental Impact Assessment
Report (EIAR)



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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; Description of the Proposed Project.

As detailed in Section 1.1.2 in 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 Site', 'Proposed Turbines', 'Proposed Grid Connection Site', 'Proposed Enhancement Site' and the 'Site'.

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 Brandon Taylor with input from Ciarán Fitzgerald and reviewed by Órla Murphy, of MKO.

Brandon Taylor is an Environmental Scientist with over three years of private consultancy experience. Brandon holds a BSc (Hons) in Geography from McGill University, and a MSc (Hons) in Coastal & Marine Environments from the University of Galway. Brandon's key skills include scientific research and report writing, particularly in the context of local communities and their interactions with environmental stressors, and geospatial analysis and the application of GIS and remote sensing tools across fields of renewable energy development, coastal zone management and education and scientific communication. Since joining MKO, Brandon has been involved in the design and environmental impact assessment of multiple large-scale onshore wind energy developments across Ireland, contributing to and managing the production of EIA reports.

Ciarán Fitzgerald is an Environmental Scientist who has been working with MKO since June 2024. Ciarán holds a B.Sc. (Honours) in Marine Science from the National University of Ireland Galway and a First-Class Honours PG. Dip in Geographic Information Systems from University College Cork. Ciarán works as part of the Environmental Renewables team as well as a larger multidisciplinary team. Ciarán's role involves undertaking tasks such as report writing, EIAR chapter writing, and QGIS mapping. Prior to joining MKO, Ciarán spent time aboard the research vessel "Celtic Explorer," working as part of a team undertaking chemical water data, pelagic species abundance and sorting, bathymetric GIS mapping, data collection, and report writing. Ciarán's key strengths lie in GIS mapping and communication. Since joining the company, Ciarán has been involved in a range of projects, including onshore wind, offshore wind, and solar, contributing by reviewing EIAR chapters and assisting with project development. Ciarán holds a membership from the Institute of Sustainability and Environmental Professionals (ISEP).

Órla Murphy is a Senior Environmental Scientist with McCarthy O'Sullivan Ltd. with over 10 years of experience in private consultancy. Órla holds 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 ITP Energised 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 and Data Sources

In addition to the guidelines referred to in Section 1.3.1 and Section 1.3.2 of Chapter 1: Introduction, 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 2024¹;
- Environmental Impact Assessment of National Road Schemes- A practical Guide, National Roads Authority/ Transport Infrastructure Ireland, Revision 1, November 2008;²
- Fáilte Ireland EIAR Guidelines for the Consideration of Tourism and Tourism Related Projects, July 2023³;
- Health Impact Assessment Resource and Tool Compilation, United States Environmental Protection Agency 2016⁴;
- Health Impact Assessment Guidance, Institute of Public Health Ireland. 2021⁵;
- Framework for Human Health Risk Assessment to Inform Decision Making developed by the United States Environmental Protection Agency (US EPA) 2014⁶;
- Institute for Environmental Management and Assessment (IEMA) (2022) Health In Environmental Impact Assessment: A Primer for a Proportionate Assessment⁷;
- Institute for Environmental Management and Assessment (IEMA) (2022) Determining Significance for Human Health in Environmental Impact Assessment⁸;
- Central Statistics Office (CSO): Census of Ireland 2016; Census of Ireland 2022; Census of Agriculture 2020⁹;

¹ Department of Health – Health in Ireland: Key Trends. Available at: <https://www.gov.ie/en/press-release/8168c-minister-for-health-publishes-health-in-ireland-key-trends-2024/#:~:text=the%20number%20of%20people%20in,perceived%20good%20health%20in%202022> [

² National Roads Authority - Environmental Impact Assessment of National Road Schemes – A Practical Guide <https://www.tii.ie/media/foodydulf/environmental-impact-assessment-of-national-road-schemes-practical-guide.pdf>

³ Fáilte Ireland - EIAR Guidelines for the Consideration of Tourism and Tourism Related Projects - <https://www.failteireland.ie/>

⁴ United States Environmental Protection Agency- The Health Impact Assessment (HIA) Resource and Tool Compilation - https://www.epa.gov/sites/default/files/2017-07/documents/hia_resource_and_tool_compilation.pdf.

⁵ Health Impact Assessment Guidance, Institute of Public Health Ireland. Available at: https://www.publichealth.ie/sites/default/files/resources/HIA%20Guidance%20A%20Manual_0.pdf [

⁶ United States Environmental Protection Agency - Framework for Human Health Risk Assessment to Inform Decision Making - <https://www.epa.gov/sites/default/files/2014-12/documents/hhra-framework-final-2014.pdf>

⁷ IEMA Health In Environmental Impact Assessment: A Primer for a Proportionate Assessment. Available at: https://www.researchgate.net/publication/358589092_Health_in_Environmental_Impact_Assessment_A_Primer_for_a_Proportionate_Approach [

⁸ Institute of Environmental Management and Assessment (IEMA) Guide to – Effective Scoping of Human Health in Environmental Impact Assessment- <https://www.iema.net/media/s35fughe/iema-eia-guide-to-effective-scoping-of-human-health-nov-2022.pdf>

⁹ Central Statistics Office – Census - <https://www.cso.ie/en/census/>

- Clare County Development Plan 2023-2029¹⁰;
- The World Health Organisation (WHO) Environmental Noise Guidelines for the European Region (WHO, 2022 Update)¹¹ <https://www.who.int/>
- The World Health Organisation (WHO) Environmental Noise Guidelines for the European Region (WHO, 2018 Update)¹².

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), Úisce 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 January 2025 including the IAA and 2RN; please see Section 15.2.4 of Chapter 15 Material Assets for further details.

Health Service Executive

A scoping response was received from the Health Service Executive (HSE) on 7th March 2025. The HSE requested a shadow flicker assessment is undertaken to identify any sensitive receptors which may be impacted by shadow flicker and noted that the environmental impact assessment must include all proposed mitigation measures, including air quality due to the nature of the proposed construction works generation of airborne dust has the potential to have significant impacts on “*sensitive receptors*”. The response stated that a Construction Environmental Management Plan (CEMP) should be included in the EIAR which details dust control and mitigation measures. The HSE further stated that the EIAR should examine all likely significant impacts and provide the following information for each:

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

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

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

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

- Public Consultation
- Decommissioning phase of the Proposed Wind Farm
- Siting and location of turbines
- Noise & Vibration
- Shadow Flicker

¹⁰ Clare County Council – Clare County Development Plan 2023-2029 - <https://clarecdp2023-2029.clarecoco.ie/>

¹¹ World Health Organization -Environmental Noise Guidelines for the European Region - <https://iris.who.int/bitstream/handle/10665/279952/9789289053563-eng.pdf?sequence=1>

¹² World Health Organization -Environmental Noise Guidelines for the European Region - <https://iris.who.int/bitstream/handle/10665/279952/9789289053563-eng.pdf?sequence=1>

- > Air Quality
- > Surface and Groundwater Quality
- > Geological Impacts
- > Ancillary facilities
- > Cumulative impacts

Impacts from shadow flicker are assessed in Section 5.3.6 and 5.4.3.2.8. An assessment of effects on human health as a result of impacts to air quality are assessed in Section 5.4.3.2.4 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 5.4.3.2.5 and in more detail within Chapter 9 Hydrology and Hydrogeology. An assessment of effects on human health as a result of impacts from noise and vibration are assessed in Section 5.4.3.2.3 and in more detail within Chapter 12 Noise and Vibration.

Úisce Éireann (Irish Water)

Úisce Éireann provided a response to a scoping request on the 3rd of March 2025, outlining the measures for consideration in the scope of an Environmental Impact Assessment (EIA). This includes steps to avoid any adverse effects on Úisce Éireann's Drinking Water Source(s) during both the construction and operational phases of the development, as well as an assessment of potential impacts on nearby public water supply infrastructure. Impacts on utilities including Úisce Éireann infrastructure are assessed in Chapter 15 Material Assets.

Fáilte Ireland

A scoping response was received from Fáilte Ireland on the 10th of February 2025 and provided the Fáilte Ireland's 'EIAR Guidelines for the Consideration of Tourism and Tourism Related Projects', to inform the preparation of the EIAR for the Proposed Project. The report provides guidance for those conducting Environmental Impact Assessment and compiling an Environmental Impact Assessment Report (EIAR), or those assessing EIARs, where the project involves tourism or may have an impact upon tourism (see Section 5.3 and Section 5.4.3.1.5 for further detail).

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 was also considered in this assessment. See Section 5.3 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 which the permanent built infrastructure footprint of the Proposed Project is located (i.e., the Proposed Wind Farm Site and Proposed Grid Connection Site), which is within and adjacent to, namely Annagh, Ballyvaskin, Cloonanaha, Fermoy and Moy, but it also refers to county and national statistics. Where the Proposed Enhancement Site is required to be considered separately, this is identified within the baseline assessment

5.2.2 Human Health

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

The World Health Organisation (WHO) defines health as:

“A state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”.⁴

5.2.2.1 National Guidance

The ‘*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*’¹³ (EPA, 2022) advise that “in an EIAR, the assessment of impacts on population and human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in this EIAR e.g., under the environmental factors of air, water, soil etc.”

Environmental impacts from the 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 Soil and Geology, Chapter 9 Hydrology and Hydrogeology, Chapter 10 Air Quality, Chapter 11 Climate, Chapter 12 Noise and Vibration, Chapter 13 Landscape and Visual, Chapter 15 Material Assets.

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

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

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

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

¹³ 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>>

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*’¹⁴ in response to gaps and inconsistencies across existing guidance documents as to how health is assessed in EIA, particularly with regard to significance. The aim of this report is to assist and streamline discussions for consultants producing the assessments and for the decision makers who are reviewing the assessments. The report states that an EIA must identify, describe and assess the direct and indirect significant effects in an appropriate manner of a Proposed Project on human health. It must include the information that may reasonably be required for reaching

¹⁴IEMA Working Group (2022) *Determining Significance For Human Health In Environmental Impact Assessment*. Available at: <https://www.iema.net/media/v1j1b2nbs/iema-eia-guide-to-determining-significance-for-human-health-nov-2022.pdf>

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 site.

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

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

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

*'Cloud amounts are reported as the number of eights (okta) of the sky covered. Irish skies are completely covered by cloud (8 oktas) for over 50% of the time. The mean cloud amount for each hour is between five and six okta. This is due to Ireland's geographical position off the northwest of Europe, close to the path of Atlantic low-pressure systems which tend to keep the country in humid, cloudy airflows for much of the time. A study at 12 stations over a 25-year period showed that the mean cloud amount was at a minimum in April and maximum in July. Cloud amounts were less at night than during the day, with the mean minimum occurring roughly between 2100 and 0100 GMT and the mean maximum occurring between 1000 and 1500 GMT at most stations.'*¹⁵

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.

¹⁵ 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 Guidelines iterates that at distances greater than ten 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.

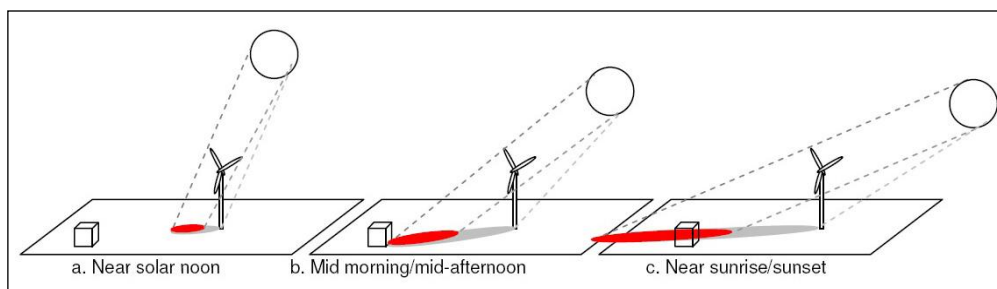


Figure 5-1 Shadow-Prone Area as Function of Time of Day (Source: Shadow Flicker Report, Helimax Energy, Dec 2008)

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.¹⁶

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 5.3.6 below.

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

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

¹⁶ 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>

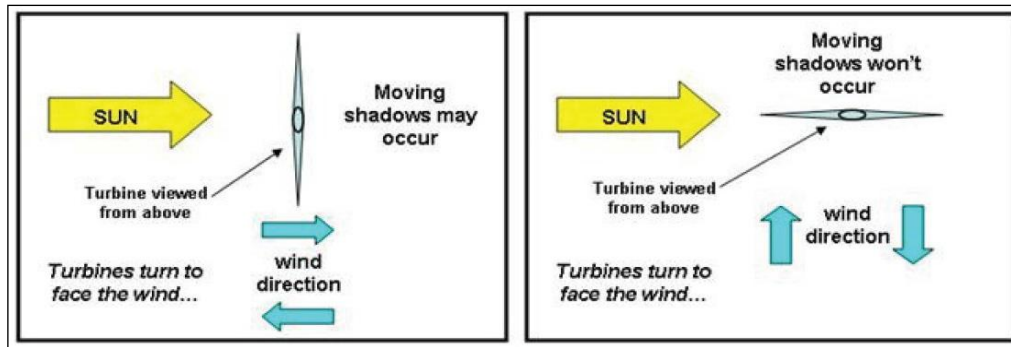


Figure 5-2 Turbine Blade Position and Shadow Flicker Impact (Source: Wind Fact Sheet: Shadow Flicker, Noise Environment Power LLC)

7. Rotation of turbine blades:

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

5.2.3.2 Guidance

The current adopted guidance for shadow flicker in Ireland is derived from the Guidelines (DoEHLG, 2006) and the 'Best Practice Guidelines for the Irish Wind Energy Industry' (Irish Wind Energy Association, 2012). The Guidelines (DoEHLG, 2006) state that at distances greater than 10 rotor 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 Project, this is assumed at 1.5 km based on a maximum rotor diameter of 150 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 should not exceed a total of 30 hours per year or 30 minutes per day.

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

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

Although the Guidelines (DoEHLG, 2006) threshold applies to properties located within 500 metres of a Proposed Turbine, for the purposes of this assessment, the thresholds of 30 hours per year or 30 minutes per day have been applied to all properties located within the Shadow Flicker Study Area (as per 'Best Practice Guidelines for the Irish Wind Energy Industry', IWEA, 2012).

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

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

The Draft Guidelines (DoHPLG, 2019) are based on the recommendations set out in the ‘*Proposed Revisions to Wind Energy Development Guidelines 2006 – Targeted Review*’ (December 2013) and the ‘*Review of the Wind Energy Development Guidelines 2006 – Preferred Draft Approach*’ (June 2017)¹⁷.

In the Annex of Actions¹⁸ for Climate Action Plan 2025 (CAP25), published in April 2025, Action EL/24/5 states that revised wind energy development guidelines for onshore wind will be published in Q1 2025. The shadow flicker methodology and assessment within this chapter are based on compliance with the Guidelines (DoEHLG, 2006), which remain to be the current adopted guidelines, under Section 28 of the Planning Development Act 2000 (as amended). However, it should also be noted the proposed turbines can be brought in line with the requirements of the Draft Guidelines (DoHPLG, 2019) through the stricter implementation of the mitigation measures outlined in Section 5.4.3.2.7.

5.2.3.3 Shadow Flicker Prediction Methodology

Shadow flicker occurs only under certain, combined circumstances, as detailed above. Where shadow flicker does occur, it is generally short-lived. The Guidelines (DoEHLG, 2006) state that careful site selection, design and planning, and good use of relevant software can help avoid the possibility of shadow flicker, all of which have been employed in the design of the 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), WindFarmer (DNV.GL), AWS OpenWind, or WindPRO: Shadow. The computer modelling of the occurrence and magnitude of shadow flicker is made possible by the fact that the sun rises and sets in the same position in the sky on every day each year.

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

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

For the purposes of this shadow flicker assessment, the software package WindPRO: Shadow – Version 4.0.552 has been used to predict the level of shadow flicker associated with the proposed turbines. 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.

¹⁷ *Proposed Revisions to Wind Energy Development Guidelines 2006 – Targeted Review* (December 2013) and the ‘*Review of the Wind Energy Development Guidelines 2006 – Preferred Draft Approach*’ (June 2017). Available at: <https://ie.rwe.com/-/media/RWE/RWE-Ireland/downloads/lyre/preferred-draft-approach-to-wind-energy-guidelines.pdf>

¹⁸ 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

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 - 175m
- > Hub Height – 100m
- > Rotor Diameter – 150m

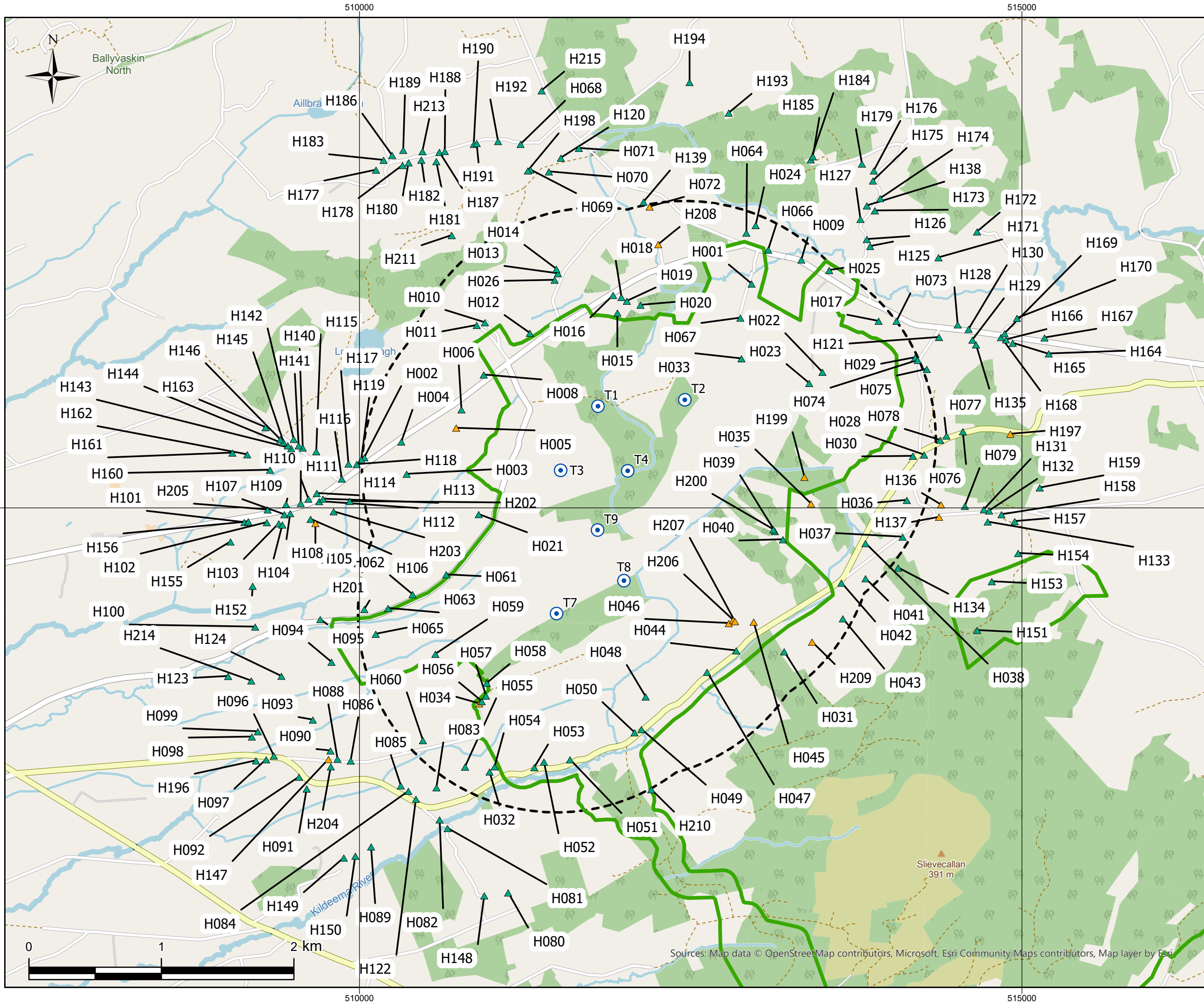
With the benefit of the mitigation measures outlined in Section 5.4.3.2.8, any turbine to be installed onsite will comply with the Guidelines (DoEHLG, 2006) thresholds of 30 minutes per day or 30 hours per year, and if necessary, with the Draft Guidelines (DoHPLG, 2019). This will be achieved through 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 'Site Selection and Reasonable Alternatives', of this EIAR, all sensitive receptors within c.2km of the area suitable for siting wind turbines within the EIAR Site Boundary were identified and mapped. This included all inhabitable and uninhabitable dwellings. 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 (150m rotor diameter x 10 = 1.5km). The Guidelines 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 1.5km from the Proposed Turbines. All properties within 1.5km of the Proposed Turbines have been considered as part of the following shadow flicker assessment. There are 74 no. properties located within 1.5km of the Proposed Turbines. Of these, a total of 28 no. properties are theoretically predicted to experience shadow flicker.

The Shadow Flicker Study Area is shown in Figure 5-3.



Map Legend

- EIAR Site Boundary
- Proposed Turbine Locations

Properties

- Derelict
- Dwelling
- Shadow Flicker Study Area - 1500m (10x150m Rotor Diameter)

Spatial Reference
Name: IREN95 Irish Transverse Mercator
Datum: IREN95
Projection: Transverse Mercator

SITE LOCATION - NOT TO SCALE

Drawing Title
Shadow Flicker Study Area

Project Title
Slieveacurry Renewable Energy Development

Project No. 240718	Drawing No. 5-3	Scale 1:26,500
Drawn By CF	Checked By BT	Date 30/04/2026

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

Sources: Map data © OpenStreetMap contributors, Microsoft, Esri Community Maps contributors, Map layer by Esri

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5.2.4 Assumptions and Limitations

5.2.4.1 Population

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

5.2.4.2 Human Health

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

5.2.4.3 Shadow Flicker

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

No screening due to trees or other buildings or vegetation is assumed. It was not considered necessary or practical to measure the dimensions of every window on every property in the Shadow Flicker Study Area. While the actual size of a window will marginally influence the incidence and duration of any potential shadow flicker impact, with larger windows resulting in slightly longer shadow flicker durations, any additional incidences or durations or shadow flicker over and above those predicted in this assessment can be countered by extending the mitigation strategies outlined in Section 5.4.3.2.8.

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 side¹⁹. 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 74 no. properties within 360 degrees of the Proposed Turbines out to 1.5km 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 'theoretically 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.

¹⁹ 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 the 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 30.56% of the daylight hours per year. This percentage is based on Met Éireann data recorded at Shannon Airport over the 30-year period from 1991 to 2020 (www.met.ie). The actual sunshine hours at the Site and therefore the percentage of time shadow flicker could actually occur is 30.56% of daylight hours. Where the annual shadow flicker is calculated for each property, it is corrected for the regional average of 30.56% sunshine, to give an accurate annual average shadow flicker prediction. Table 5-13 below outlines whether a shadow flicker mitigation strategy is required for any property within the Shadow Flicker Study Area which may be impacted by shadow flicker.

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 Clare County Development Plan 2023-2029, 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 approx. 5.8km east of Miltown Malbay, approx. 7km south of Ennistimon and 8 km west of Inagh Co. Clare. Please refer to Figure 1-1 of Chapter 1; Introduction for the Site Location map. The R460 Regional Road runs in a southwest-northeast orientation along the southern boundary of the Proposed Wind Farm Site and will facilitate the proposed underground cabling connection to the existing Slieveacallan 110kV substation. The L6230 Local Road runs in north-south orientation within the northern boundary of the Site, which will also facilitate site access to the Proposed Wind Farm Site. The Proposed Project falls within the townlands listed in Table 1-1 of Chapter 1; Introduction. Current land-use on the Site comprises coniferous forestry, agriculture, turf cutting, existing renewable energy infrastructure and public road corridor. Land-use in the wider landscape comprises a mix of agriculture, low density housing, renewable energy and commercial forestry.

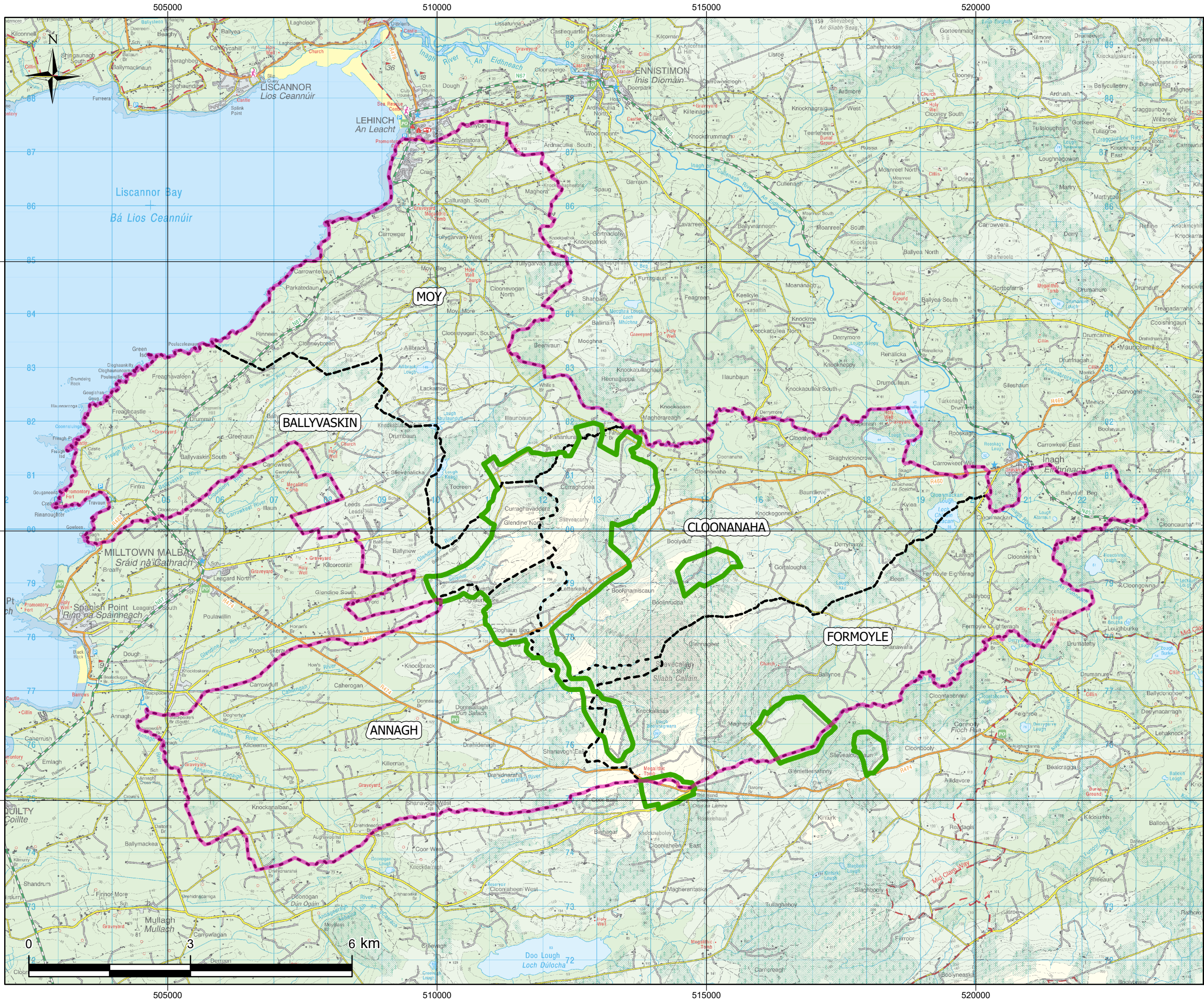
As identified in Section 5.2.1 above, the Population Study Area lies within 5 no. EDs: Annagh, Ballyvaskin, Cloonanaha, Moy, and Formoyle as shown in Figure 5-4. These EDs will collectively be referred to hereafter as the Population Study Area for this chapter. The Population Study Area has a population of 2,178 persons as of 2022, with the populations of each electoral division as follows:

- Annagh (516 persons)
- Ballyvaskin (422 persons)
- Cloonanaha (252 person)
- Moy (765 persons)

➤ Formoyle (223 persons)

The total land area of the Population Study Area totals 125.1km² and comprises Annagh 28.2 km², Ballyvaslin 21.1km², Cloonanaha 25.8km², Moy 26.0 km² and Formoyle 24.0 km².

There are 32 no. sensitive receptors located within 1km of the Proposed Turbines. The closest sensitive receptor, belonging to an involved landowner, is located over 500m from the nearest proposed turbine (T2), i.e. over the minimum recommended setback for properties involved in the project (500m). The closest third-party sensitive receptor is located greater than 700m from the nearest proposed turbine (T3), i.e. over the recommended 4x tip height setback (700m) from properties not involved in the project (as recommended in the draft Guidelines).



Map Legend

- EIAR Site Boundary
- Population Study Area
- Slieveacurry EDs:
 - Ballyvaskin, Annagh, Cloonanaha, Moy and Formoyle

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

SITE LOCATION - NOT TO SCALE

Population Study Area

Project Title: **Slieveacurry Renewable Energy Development**

Project No.	Drawing No.	Scale
240718	5-4	1:65,000
Drawn By: CF	Checked By: BT	Date: 16/01/2026

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

5.3.1.1 Population Trends

The recently published Census of 2022 shows that the population of Clare grew by over 7% to 127,938 since the 2016 Census. Over the same period, Ireland's population grew by 8% from 4,761,865 to 5,149,139. Population statistics for the State, County Clare 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	+8.13%
County Clare	118,817	127,938	+7.68%
Population Study Area	2,074	2,178	+5.01%

The data presented in Table 5-1 shows that the population of the Population Study Area increased by 5.01% between 2016 and 2022. This rate of population growth is lower than that recorded at State level and higher than to the County level. When the population data is examined in closer detail, it shows that the rate of population increase within the Population Study Area has been unevenly spread through the EDs. The highest increase in the population between 2016 and 2022 occurred within the Moy and Ballyvaskin and Formyle EDs, which experienced a 10.55%, 5.76% and 5.19% population increase, respectively. The population of Annagh ED also increased but only by 2.38%. The population of Cloonahaha ED was the only ED during this time that had a decrease in population, decreasing by 5.62% over the 6 years.

5.3.1.2 Population Density

The population densities recorded within the State, County Clare and the Population Study Area during the 2016 and 2022 Censuses 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	67.8	73.3
County Clare	34.4	37.1
Population Study Area	16.6	17.4

The population density of the Population Study Area recorded during the 2022 Census is 17.4 persons per km² which is considerably lower than the national population densities of 73.3 persons per km² and lower than the population density of County Clare, recorded at 37.1 persons per km², respectively. Similar to the observed population trends, the population density recorded across the Population Study Area varies between EDs. Moy ED has the highest population density in 2022, at 29.4 persons per km². Ballyvaskin and Annagh EDs have similar population densities to the average with 20 and 18.29 person per km² respectively. Cloonahaha and Formyle EDs had the lowest population density of 9.8 and 9.3 persons per km².

5.3.1.3 Household Statistics

The number of households and average household size recorded within the State, County Clare 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	1,702,289	2.75	1,841,152	2.74
County Clare	43,469	2.69	46,553	2.67
Population Study Area	798	2.59	852	2.56

The figures in Table 5-3 show that while the number of households within the State, County and the EDs increased, the average number of people per household remained similar due to the proportionate increase in population during this period. Average household size recorded within the Population Study Area during the 2016 and 2022 Censuses is slightly below those observed at State and County level during the same time period. The average household size recorded in the Population Study Area is consistent between EDs with a variance of 0.3 persons per household. Formoyle ED had the highest recorded 2.73 persons per household in 2022, close to the national average. Ballyvaskin ED was the closest to the national average with 2.69 persons per household. Annagh ED and Moy ED had close to the study area average with 2.57 and 2.5 persons per household respectively. Cloonanaha had the lowest average household size with 2.4 persons per household recorded in 2022.

5.3.1.4 Age Structure

Table 5-4 presents the population percentages of the State, County Clare 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-

Table 5-4 Population per Age Category in 2022 (Source: CSO)

Area	Age Category				
	0 - 14	15 – 24	25 - 44	45 - 64	65 +
State	19.7%	12.5%	27.6%	25.1%	15.1%
County Clare	19.5%	12.4%	24.0%	27.1%	16.9%
Population Study Area	17.6%	11.7%	21.2%	29.4%	20.2%

County Clare's population in 2022 was comprised of 127,937. The average age of Clare's population in 2022 was 40.1 years, compared with 38.5 years in 2016. Nationally, the average age of the population was 38.8, up from 37.4 in 2016. The number of people aged 65 and over continues to grow. This age group increased by 22.7% to 4002 in Clare, and by 45% to 240922 at a national level since 2016. The proportion of the Population Study Area population within each age category is lower than those recorded at national and county level for most categories except the 45-64 and 65+ categories, where

the Population Study has a 4.3% larger proportion of the population aged 45-64 years and a 5.1% larger proportion of the population aged 65 year or older, than the national population. Within the Population Study Area, the highest population percentage occurs within the 45-64 age category.

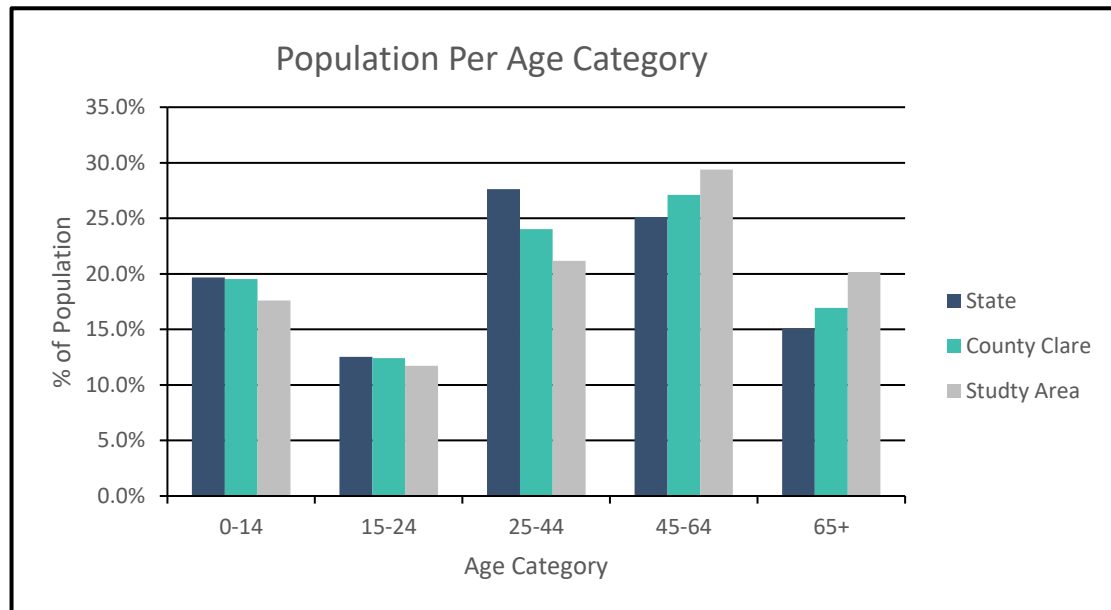


Figure 5-5 Population per Age Category in 2022 (Source: CSO)

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 56,144 people (aged 15 and over) at work in Clare, an increase of 6,633 people (+13.4%) between 2016 and 2022. Nationally, there were 313,656 (+16%) additional people in 2022 at work compared to 2016. Table 5-5 shows the percentage of the total population aged 15+ who were in the labour force in the State during the 2022 Census. 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 Economic Status of the Total Population Aged 15+ in 2022 (Source: CSO)

Status		State	County Clare	Population Study Area
% of population aged 15+ who are in the labour force		62%	59%	58%
% of which are:	At work	92.67%	92.87%	93.38%
	Looking	1.36%	1.33%	0.77%
	Unemployed	6.96%	6.8%	5.85%
% of population aged 15+ who are not in the labour force		38.82%	40.63%	41.89%
	Student	28.60%	28.03%	23.27%

Status		State	County Clare	Population Study Area
% of which are:	Home duties	16.96%	15.69%	17.42%
	Retired	40.96%	43.79%	49.47%
	Unable to work	11.79%	10.67%	7.98%
	Other	1.69%	1.81%	1.86%

Overall, the principal economic status of those within the labour force living in both County Clare and the Population Study Area is higher than that recorded at State level. Both County Clare and the Population Study Area has higher employment rates of 92.87% and 93.38% respectively compared to the State 92.67%. County Clare and the Population Study Area also have lower percentages for those looking for jobs or those who are unemployed. 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 State and County level that show 'retired' as the highest category.

5.3.1.5.2 Employment by Socio-Economic Group

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

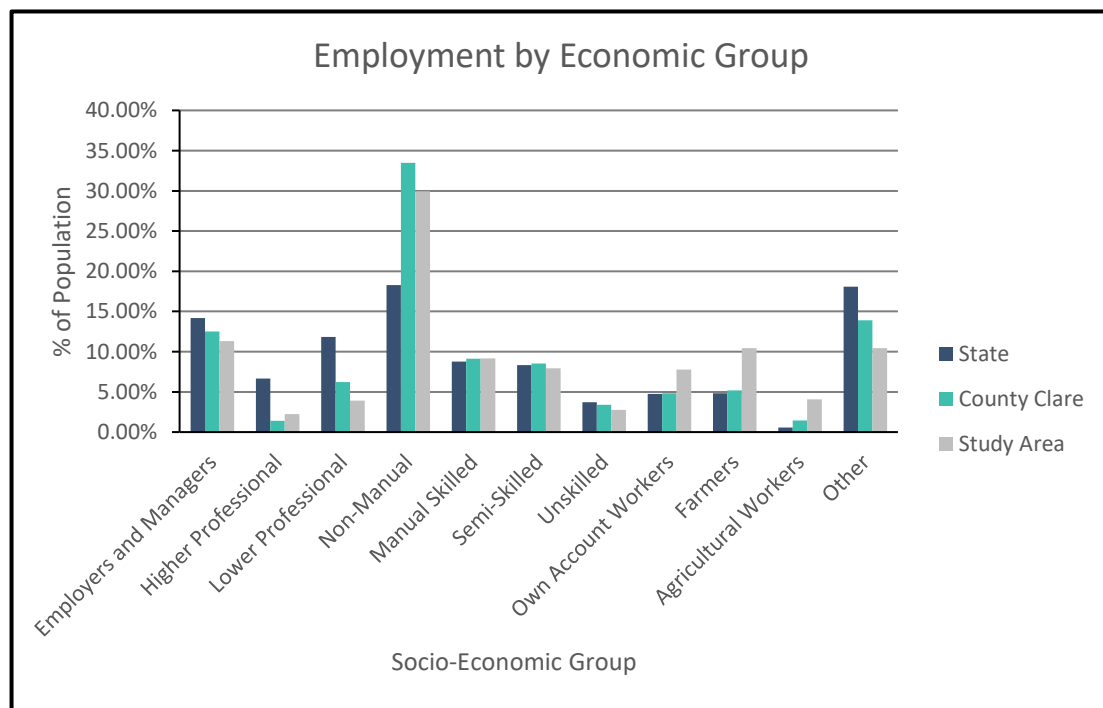


Figure 5-6 Persons in private households by socio-economic group in 2022 (Source: CSO).

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

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

5.3.1.5.3 **Employment and Investment Potential in the Irish Wind Energy Industry**

A report entitled '*Jobs and Investment in Irish Wind Energy – Powering Ireland's Economy*²⁰ 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*²¹, 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 Ireland²² 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.

²⁰ Deloitte, Irish Wind Energy Association 2009 *Jobs and Investment in Irish Wind Energy Powering Ireland's Economy*. Available at: <https://windenergyireland.com/images/files/9660bd5e72bcac538f47d1b02cc6658c97d41f.pdf>

²¹ Siemens (2014) *An Enterprising Wind - An economic analysis of the job creation potential of the wind sector in Ireland*. Available at: <https://www.esri.ie/publications/an-enterprising-wind-an-economic-analysis-of-the-job-creation-potential-of-the-wind>

²² SEAI (2019), https://www.seai.ie/publications/Wind_Energy_Roadmap_2011-2050.pdf

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 1.6 of Chapter 1; Introduction, 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*”²³ published by the Irish Wind Energy Association (IWEA) predicted that the wind energy sector in Ireland would result in 6,659 direct jobs in a scenario where 4GW capacity is achieved by 2020. This figure of 6,659 is broken down further; 5,596 of these jobs are associated directly with the construction and installation of windfarms, while the remaining 1,063 jobs are associated with the national grid. Under this scenario this contributes 1.66 direct jobs per Megawatt (MW) of wind capacity throughout the various stages of installation. According to Wind Energy Ireland, the installed wind capacity in Ireland is over 4.3GW as of February 2021, which would support employment during the last decade. Ireland needs to achieve a total of 9GW of onshore wind by 2030 which will further support further employment.

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

The 2014 report ‘*The Value of Wind Energy to Ireland*’²⁴, 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 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*’²⁵ 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 Cork²⁶ (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.

²³ IWEA (2014) *An Enterprising Wind: An economic analysis of the job creation potential of the wind sector in Ireland*. Available at: <https://www.esri.ie/publications/an-enterprising-wind-an-economic-analysis-of-the-job-creation-potential-of-the-wind>

²⁴ Pöyry *The Value of Wind Energy to Ireland* – March 2014

²⁵ WindEurope (2017) *Wind Energy in Europe Scenarios for 2030* <<https://windeurope.org/wp-content/uploads/files/about-wind/reports/Wind-energy-in-Europe-Scenarios-for-2030.pdf>>

²⁶ <https://www.marei.ie/our-climate-neutral-future-zero-by-50/>

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*’²⁷ 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 2026, there were 6.48GW of wind energy capacity installed on the island of Ireland²⁸. Of this, 5.1GW 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*’²⁹, has analysed the financial impact for end consumers of the deployment of wind generation in Ireland over the period 2000-2020. The report calculates how the costs and benefits for consumers would have differed if no wind farms had been built. The analysis indicated that the deployment of 4.1GW of wind generation capacity in Ireland between 2000 and 2020 (2018-2020 results being projective) will result in a total net cost to consumers, over 20 years, of €0.1 billion (€63 million to be exact), which equates to a cost of less than €1 per person per year since 2000. Further cost benefit analysis noted that wind energy has delivered €2.3 billion in savings in the wholesale electricity market. As such, the economic benefit of renewable energy to consumers is greater than what would have been if Ireland did not invest in wind power. This corresponds with the Deloitte report which indicates that more wind energy feeding into the national grid will result in lower and more stable energy costs for consumers.

Furthermore, in May 2020, IWEA released its 70by30 Implementation Plan Reports³⁰ which further details the savings that can be made from the continuation of onshore wind. The report, entitled ‘*Saving Money - 70 by 30 Implementation Plan*’, notes that ‘*Baringa calculated previously that if onshore wind in Ireland can be delivered at €60/MWh, on average, between 2020 and 2030, then the 70 per cent renewable electricity target set out in the Climate Action Plan will actually be cost neutral for the consumer. If we can achieve prices under €60/MWh then Ireland’s electricity consumers will be saving money.*’

The 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 use within the Site are predominantly comprised of coniferous forestry, agriculture, turf cutting, existing renewable energy infrastructure and public road corridor. The primary surrounding land use within the Population Study Area is that of agriculture, low density housing, renewable energy and commercial forestry. The total area of farmland within the 5 EDs, around the Site, measures approximately 8,450.6 hectares, comprising 67.55% of the Population Study Area, according to the CSO

²⁷ WindEurope (2022) *Wind Energy in Europe 2021 Statistics and the Outlook for 2022-2026* <<https://windeurope.org/intelligence-platform/product/wind-energy-in-europe-2021-statistics-and-the-outlook-for-2022-2026/>>

²⁸ Eirgrid, <https://www.eirgrid.ie/grid/system-and-renewable-data-reports>

²⁹ Baringa (2019) *Wind for a Euro: Cost Benefit Analysis of Wind Energy in Ireland 2000-2020*

<<https://www.baringa.com/en/insights/low-carbon-futures/our-market-and-policy-studies-in-ireland/wind-for-a-euro/>>

³⁰ https://windenergyireland.com/all-documents?file_category=21

Census of Agriculture 2020. There are 325 farms located within the five EDs, with an average farm size of 27.02 hectares. This is lower than the average 31.5-hectare farm size for Co. Clare. Table 5-6 shows the breakdown of farmed lands within the five EDs.

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

DED	No of holdings	Average size (hectares)	Median age of holder	Livestock units	Area farmed (hectares)
Annagh	98	23	59	2,065	2,257.80
Ballyvaskin	60	30.4	60	1,538	1,826.80
Cloonanaha	48	31.4	60	865	1,508.70
Moy	82	22.2	58	1896	1,817.40
Fermoyle	37	28.1	58	552	1039.9
Total	325	27.02 (average)	59 (average)	6,916	1,852.68 (average)
Size of 5 EDs			12,510 hectares		
Total Area Farmed within 3 EDs			8,450.6 hectares		
Farmland as % of EDs			67.55%		

5.3.1.7 Equine Industry

2 no. stud farms or equestrian facilities was identified within 10 km of the Proposed Turbines; Kulinshof Stud, located in Rockmount, Co. Clare, approximately 4 km north of the nearest proposed turbine (T02) and Hestakot, approximately 4.8 km southwest of the nearest proposed turbine (T07).

There have been no known studies carried out in Ireland on the impacts of wind farms on the equine industry. In 2014 Marshall Day Acoustics published a document entitled “*Summary of research of noise effects on Animals*”³¹. The Marshall Day study specifically assessed the impacts of varying levels of noise on horses in three differing behavioural settings. The three behavioural settings studied included horses in stables, breeding mares and racing horses.

Horses in Stables

The study by Marshall Day Acoustics found that horses, stabled at the Flemington Racecourse in Australia at the same time as a music concert took place on the site, when exposed to $L_{Aeq,15min}$ of 54-70 dB, showed little response to the music noise unless the noise was particularly impulsive. The horses stabled at Flemington Racecourse were thoroughbreds, and stables were located 200 metres from the concert.

³¹ Marshall Day Acoustics, 2014. Summary of Research of Noise Effects on Animals Available at: <https://www.epa.govt.nz/assets/FileAPI/proposal/NSP000033/Hearings/3a009a795c/BoD-Volume-4-31-Siiri-Wilkening-10-March-2014-Summary-of-research-of-noise-effects-on-animals.pdf>

Breeding Mares

A study by Le Blanc et al. (1991) and summarised by Marshall Day studied the effects of simulated aircraft noise over 100 dB and visual stimuli on pregnant mares in the United States. Aircraft noise generates infrasound, which is also generated from wind turbine, cars and trains. The study focused on pregnancy success, behaviour, cardiac function, hormonal production, and rate of habitation. Noise levels of 100 dB are similar to that of the Vestas 150 turbine operating at 5m/s wind speed, as indicated in Chapter 12: Noise and Vibration. Le Blanc concluded the following:

“ [the] birth success of pregnant mares was not affected by F-14 jet aircraft noise. While the ‘fright-flight’ reaction was initially observed, the mares did adapt to the noise.”

Racehorses

Marshall Day Acoustics concluded the following in relation to their study on the impacts of noise on racehorses:

“Marshall Day Acoustics have observed horses grazing in paddocks directly under the main approach path of the Christchurch International Airport where noise levels are in excess of 90 dB (LAmax) during an aircraft flyover. Although these horses are arguably “used to” the noise, there was generally little recognition by them of an aircraft passing, let alone any sign of disturbance. This tends to support the conclusions by Le Blanc et al. (1991).”

5.3.1.7.2 Guidance

In the absence of national policy or guidance in relation of the development of wind farms near stud farms/equestrian centres, MKO has reviewed the British Horse Society’s ‘Advice on Wind Turbines and Equestrian Access’. A copy of the guidance document is included in Appendix 5-3 of this EIAR.

The British Horse Society policy statement states the following in relating to the siting of wind turbines in the vicinity of equine businesses:

*“The British Horse Society strongly recommends 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”,*

This is an update from the previous guidance of *“a minimum separation distance of 200m or three times blade tip height (whichever is greater) will be required between a turbine and any route used by horses or a business with horses.”*

5.3.1.7.3 Summary

On a precautionary basis, i.e., under the assumption that every inhabitable dwelling owns a horse or horses, the closest inhabitable dwelling, not including involved properties, is located approximately 578 metres (over four-times blade tip height) from the nearest proposed turbine location. As mentioned previously, the closest stud farm/equestrian facility is located approximately 4 km from the nearest Proposed Wind Farm turbine (T02). In this instance, the Proposed Turbines are at a distance beyond that of the British Horse Society’s recommended minimum separation distance of blade tip height plus 10%. In this instance, the minimum separation distance from Proposed Turbines exceeds the 525 metres separation distance (based on two times the turbine blade tip height of up to 175 metres) between a turbine and any routes used by horses

5.3.1.8 Services

The Site is located approximately 7km south of Ennistimon, Co. Clare and 8km west of Inagh, Co. Clare. The town of Milltown Malbay is located approx. 5.8km east of the nearest proposed turbine (T07). The Proposed Project is accessed via an existing access track off the local road to the northwest of the Proposed Wind Farm Site. The Site itself is served by a number of existing forestry and agricultural roads and tracks. The main services for the Population Study Area are located within Milltown Malbay which is classified as a small town and Ennistimon, which is classified as a service town. Additionally, the nearest county town, Ennis, where larger scale retail and services are available, lies approximately 21.5km east of the Site.

5.3.1.8.1 Education

The nearest school to the Proposed Project is Cloonanaha National School, located approximately 1.4 km to the east of the nearest Proposed Turbine (T5). Rockmount Mixed National School is located approximately 2.25 km to the west of the nearest Proposed Turbine (T3) and Moy National School is located approximately 3.7 km to the northwest of T7.

The closest secondary school is Ennistimon Vocational School located approximately 7.6km north of the nearest Proposed Turbine (T2), and CBS Secondary School in Ennistimon is located approximately 7.9 km north of the nearest Proposed Turbine (T2).

The closest third-level institutes to the Site are Limerick Institute of Technology, Mary Immaculate College, National University of Ireland Galway and Atlantic Technological University, all located in excess of 40km northeast and southeast of the Site.

5.3.1.8.2 Access and Public Transport

The Proposed Project is accessed via an existing access track off the local road to the northwest of the Proposed Wind Farm Site. The Site itself is served by a number of existing forestry and agricultural roads and tracks. There is no public transport access to the Site. The nearest bus routes from which several daily connections are available, can be accessed in Milltown Malbay, approximately 5km east of the Site.

5.3.1.8.3 Amenities and Community Facilities

Most of the amenities and community facilities, including GAA and other sports clubs, youth clubs, recreational areas, retail and personal services are available in the nearby towns of Milltown Malbay, Lahinch, and Ennistimon, and the village of Inagh. Larger scale services are available in the larger county town of Ennis.

The varied environment of this area of County Clare provides many opportunities for swimming, walking, cycling and playing golf. There are a number of beaches to the west of the Proposed Project which are located along the Wild Atlantic Way tourist route, the closest being White Strand Beach, south of Milltown Malbay, which is located 7.3km west of the Proposed Project. The Lahinch to Kilrush walking route is approximately 7.2km west of the Proposed Project at its closest point where there is a walking and cycling trail along a dismantled railway stretching 40km from Lahinch to Kilrush.

Community Benefit proposals, which would enhance local amenities and community facilities are described in Chapter 4: Description of the Proposed Project.

5.3.2 Tourism

For the purposes of this section, the Proposed Wind Farm Site is considered solely in relation to the tourism baseline assessment set out below in this section. Due to the temporary nature of the works and

any potential effects associated with the Proposed Grid Connection Site and Proposed Enhancement Site, 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 2023*³², pertaining to domestic and international tourism volumes for Ireland, was published by Fáilte Ireland in October 2024 for the year 2023. In 2023, out-of-state (Overseas and Northern Ireland) tourist expenditure amounted to €6 billion. With a further €970 million spent by overseas visitors on fares to Irish carriers, foreign exchange earnings were €7 billion. Domestic tourism expenditure amounted to €3.1 billion, making tourism a €10 billion industry. The Central Statistics Office's estimates the number of people employed in 'Tourism Industries' to be 226,700 in Q3 2023 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 2023 ('*Key Tourism Facts 2024*, Fáilte Ireland, August 2025).

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

Region	Total Revenue (€m)	Total Number of Non-Domestic Tourists (000s)
Dublin	€2,383m	4,094
Mid-East/Midlands	€536m	804
South-East	€323m	530
South-West	€1168m	1,442
Mid-West	€536m	827
West	€847m	1,226
Border	€376m	525
Total	€5,117m	9,448

³² Fáilte Ireland (2024) *Key Tourism Facts 2023*

<https://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/Research/Key%20Tourism%20Facts%20and%20Figures%202023/FI_Key-Tourism-Facts-2023_National-Summary_FINAL.pdf?ext=.pdf>

The Mid-west Region, in which the Site is located, comprises Counties Clare, Limerick and Tipperary. This Region benefited from approximately 8.3% of the total number of overseas tourists to the country and approximately 9% of the total tourism income generated in Ireland in 2019.³³

Table 5-8 presents the county-by-county breakdown of overseas tourist numbers and revenue to the South-East Region during 2017 (*2017 Topline Tourism Performance By Region, Fáilte Ireland, August 2018*)³⁴. There is no published County by County tourism breakdown for 2018 to 2024 to date. As can be observed, County Clare had the highest number of overseas tourists visiting the Region during 2017 and had tourism revenue at €158 million

Table 5-8 Overseas Tourism to Border Region during 2017 (Source: Fáilte Ireland)

County	Revenue Generated by Overseas and Domestic Tourists (€m)	No. of Overseas Tourists (000s)
Clare	158	749
Limerick	261	647
Tipperary	23	53

5.3.2.2 Tourist Attractions

There are no key identified tourist attractions pertaining specifically to the site of the Proposed Project itself.

Tourism Attractions within the surrounding landscape

Key tourist attractions within County Clare include the Cliffs of Moher, the Burren National Park and Bunratty Castle and Folk Park. Within the north and west of the county, many additional tourist attractions are found in Ennis, Miltown Malbay and Spanish Point, Lahinch and Liscannor, Creagh, Quilty, Lisdoonvarna, Kilfenora, Inagh, Doonbeg and Cooraclare, all of which lie within 20 kilometres of the Proposed Project. The Discover Ireland website (www.discoverireland.ie) lists the following attractions within each location:

- White Strand Beach, south of Milltown Malbay, which is located 7.3km west of the Site.
- Lahinch Beach south of Lahinch, which is 7.2km north of the Site
- The Lahinch to Kilrush walking route is approximately 7.2km west of the Site at its closest point where there is a walking and cycling trail along a dismantled railway stretching 40km from Lahinch to Kilrush.
- A number of golf courses including Lahinch Golf Course 7.5km north-west of the site and Castle Course in Lahinch 7.5km north-west of the Site.
- The Cliffs of Moher, a UNESCO Global Geopark, and tourist visitor centre is located approximately 12.6km northwest of the Site. Hags Head, a natural landmark and unique rock formation situated at the southern extent of the Cliffs of Moher is another popular tourist destination and is located 13km northwest of the Site.

³³ Fáilte Ireland Key Tourism Facts 2019, March 2021. Available at:

https://www.failteireland.ie/FailteIreland/media/WebSiteStructure/Documents/3_Research_Insights/4_Visitor_Insights/KeyTourismFacts_2019.pdf?ext=.pdf

³⁴ 2017 Topline Tourism Performance By Region, Fáilte Ireland, August 2018. Available at:

https://www.failteireland.ie/FailteIreland/media/WebSiteStructure/Documents/3_Research_Insights/2_Regional_SurveysReports/2017-topline-regional-tourism-performance.pdf?ext=.pdf

- Doolin Cave and Visitors Centre, which includes gardens and a small farm, is an award winning tourist attraction that is located 19.2km northwest of the Site. Doolin pier, an important transport location for ferry connections to the Aran Islands and for boat tours beneath the Cliffs of Moher, is located 16.7km northwest of the Site.
- Dysert O'Dea Castle and Archaeology Centre, a restored 15th Century Castle surrounded by heritage walking trails at many archaeological sites, is located approximately 15.4km northeast of the Site.
- As the County Hub, Ennis has many outdoor recreational and tourist amenities within its vicinity, including: Golf Courses; Hotels; Walking Trails and Parkland, and is located 18km east of the Site.

The potential for visual effects arising from the Proposed Project on the wider landscape and scenic roads is assessed in Chapter 13; 'Landscape and Visual' of this EIAR.

There are no tourist attractions located within the Proposed Grid Connection Site or the Proposed Enhancement Site .

5.3.2.3 Tourist Attitudes to Wind Farms

5.3.2.3.1 Scottish Tourism Study 2021

BiGGAR Economics undertook an independent study in 2021, entitled '*Wind Farms & Tourism Trends in Scotland: Evidence from 44 Wind Farms*³⁵' 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.

³⁵ BiGGAR Economics (2016) *Wind Farms and Tourism Trends in Scotland* <<https://biggareconomics.co.uk/wp-content/uploads/2021/11/BiGGAR-Economics-Wind-Farms-and-Tourism-2021.pdf>>

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*’.³⁶

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:

“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

³⁶ 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>

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 Guidelines (DoEHLG, 2006) and the Draft Guidelines (DoHPLG, 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*’³⁷. The updated survey found that of 1,000 domestic and foreign tourists who holidayed in Ireland during 2012, over half of tourists said that they had seen a wind turbine while travelling around the country. Of this number of tourists, 21% claimed wind turbines had a negative impact on the landscape. However, 32% said that it enhanced the surrounding landscape, while 47% said that it made no difference to the landscape. Almost three quarters of respondents claim that potentially greater numbers of wind farms would either have no impact on their likelihood to visit or have a strong or fairly strong positive impact on future visits to the island of Ireland.

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

5.3.3 Public Perception of Wind Energy

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

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

Background

In May 2023 the Sustainable Energy Authority of Ireland (SEAI) published a report on the national survey they commissioned of people’s opinions of new commercial solar or wind farm projects in Ireland³⁸. In 2022, surveyors conducted in-person interviews on the doorstep across rural Ireland. The survey included 1,764 households which included 1,116 households within 5km of a new commercial wind or solar project sites, of which 219 live within 1km of a project site.

2023 Findings

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

³⁷ Fáilte Ireland (2008) *Visitor Attitudes on the Environment: Wind Farms – Update on 2007*. Available at <[https://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/4_Visitor_Insights/WindFarm-VAS-\(FINAL\)-\(2\).pdf?ext=.pdf](https://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/4_Visitor_Insights/WindFarm-VAS-(FINAL)-(2).pdf?ext=.pdf)>

³⁸ SEAI Irish national survey of households near new commercial wind and solar farms. Available at: <<https://www.seai.ie/publications/SEAI-RESS-National-Survey.pdf>>

The 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 support for Ireland's energy transition.

5.3.3.1.2 Sustainable Energy Authority of Ireland Survey 2003

Background

The results of a national survey entitled 'Attitudes Towards the Project of Wind Farms in Ireland' were published by the Sustainable Energy Authority of Ireland (SEAI) in 2003 and updated in 2017 – see Section 5.4.1.3 below. A catchment area survey was also carried out by SEAI (formerly SEI) in order 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 Project, the national survey reveals that attitudes towards wind energy are influenced by a perception that wind is an attractive source of energy:

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

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

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

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

Survey Update 2017

Additionally, a survey carried out by Interactions in October 2017³⁹, published by the SEAI, show 47% of Irish adults polled said they were strongly in favour of wind power in Ireland while a further 38% favour it. Overall, this is a 4% increase in favourable attitudes towards wind power compared with similar research in 2013.

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

Conclusions

The main findings of the SEAI survey in 2017 indicate that the overall attitude to wind farms is “almost entirely positive”. The study highlights that two-thirds of Irish adults are either very favourable or fairly favourable to having a wind farm built in their locality, with little evidence of a “Not In My Back Yard” (NIMBY) effect. 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 Project 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 Projects – especially important since it is voiced by those who know from direct experience about the impact of such Projects on their communities.”

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

Background

A survey of the public perception of wind power in Scotland and Ireland was carried out in 2003/2004 by researchers at the School of Geography & Geosciences, University of St. Andrews, Fife and The Macaulay Institute, Aberdeen (*Green on Green: Public Perceptions of Wind Power in Scotland and Ireland*, Journal of Environmental Planning and Management, November 2005). The aims of the study were to ascertain the extent to which people support or oppose wind power, to investigate the reasons

³⁹ Interactions Research (2017). *Public Attitudes to Wind Energy in Ireland*. Survey commissioned by the Irish Wind Energy Association (IWEA) <https://windenergyireland.com/images/files/iwea-report-2018.pdf>

for these attitudes and to establish how public attitudes relate to factors such as personal experience of operational wind farms and their proximity to them.

Study Area

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

Findings

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

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

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

The reasons that people gave for their positive attitude to the local wind farm were predominantly of a global kind, i.e. environmental protection and the promotion of renewable energy, together with opposition to a reliance on fossil fuels and nuclear power. Problems that are often cited as negative effects of wind farms, such as interference with telecommunications and shadow flicker were not mentioned at either site. With regards to those who changed to a more positive attitude following construction of the wind farm, the reasons given were that the wind farm is “not unattractive (62%), that there was no noise (15%), that community funding had been forthcoming (15%) and that it could be a tourist attraction (8%)”.

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

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

Conclusions

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

5.3.3.3 Wind Energy Ireland National Polls on Wind Energy

IWEA Interactions Opinion Poll on Wind Energy 2019

Published in January 2020, 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 Projects. Other reasons cited for supporting wind energy Projects include: "economic benefits," "reliable/efficient," "positive experience with wind energy" and recognise it as a "safe resource." When questioned about wind Projects 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 Projects in their local area include: "good for the environment," "social responsibility," "create jobs," "good for the community."

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

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

The 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.

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.⁴⁰ The objective of the poll was to *‘measure and track public perceptions and attitudes around wind energy amongst Irish adults.’*

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

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

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

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

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 Monitor⁴¹. 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 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 CO₂ 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.

⁴⁰ <https://windenergyireland.com/about-wind/more-resources/annual-wind-survey>

⁴¹ 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>

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.

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

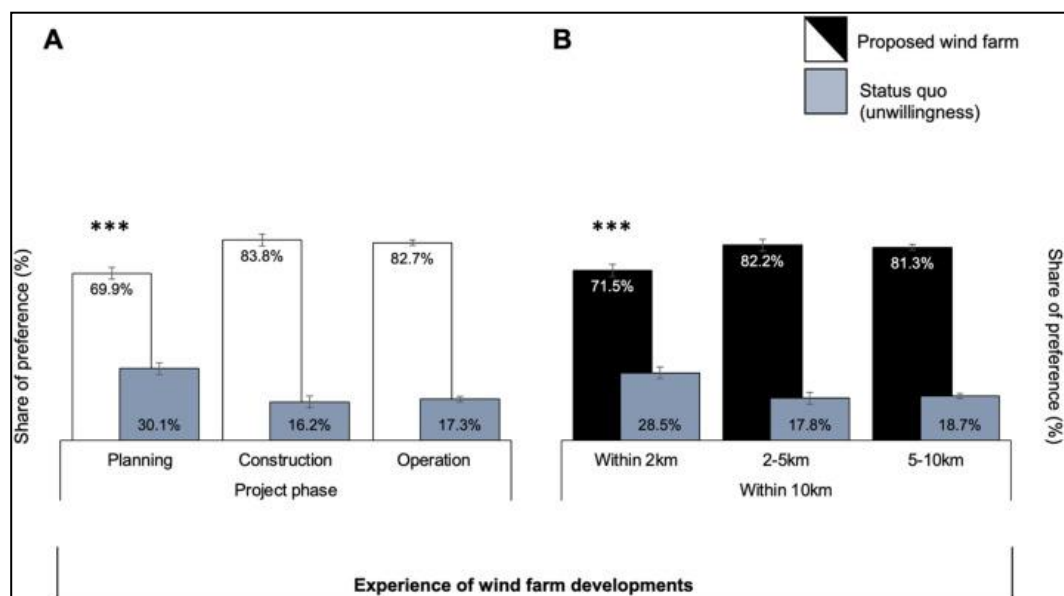


Figure 5-7: Share of preference for a 'best-case' combination of wind development features and the status quo (A) over phase of project development; and (B) over proximity to the wind farm. (Le Maitre et al. 2024)

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

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

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

5.3.4 Health 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 2009⁴²*

⁴² https://www.novoco.com/public-media/documents/awea_soundwhitepaper_121109_0.pdf

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.”

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 2010⁴³

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 Australia⁴⁴

⁴³ <http://psew.pl/en/wp-content/uploads/sites/2/2017/01/3b041e47d7f8029dfc10fee7d3249721.pdf>

⁴⁴ <https://pubmed.ncbi.nlm.nih.gov/36946580/>

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

- All staff and participants were asked whether they were able to differentiate in any way between infrasound and sham infrasound (the control), and none of them were able to.
- The study found that 72 hours of the simulated wind turbine infrasound (~90dB pk re 20 µPa) in controlled laboratory conditions did not worsen any measure of sleep 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 2010⁴⁵***

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 2012⁴⁶***

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

⁴⁵ <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>

⁴⁶ <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>

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.

6. ‘Wind Turbine Health Impact Study -Report of Independent Expert Panel’ – Massachusetts Departments of Environmental Protection and Public Health (2012)⁴⁷

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:

⁴⁷ <https://www.mass.gov/doc/wind-turbine-health-impact-study-report-of-independent-expert-panel/download>

“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)*⁴⁸

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.
- 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.*⁴⁹

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.

⁴⁸ <https://pubmed.ncbi.nlm.nih.gov/25376420/>

⁴⁹ <https://www.who.int/europe/publications/item/9789289053563>

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

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

9. *Infrasound Does Not Explain Symptoms Related to Wind Turbines: Finnish Government's Analysis, Assessment and Research Activities (VN TEAS), 2020.*⁵⁰

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

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

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

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

The report notes:

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

As a result:

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

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

The purpose of this paper was to review evidence from current literature with regards to effects on noise emissions, infrasound, ice throw and visual impacts. The paper shows that these effects are either negligible or effectively mitigated by modern technologies and safety standards. It was noted that misinformation and psychological factors such as nocebo effects (psychological phenomenon in which

⁵⁰ https://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/162329/VNTEAS_2020_34.pdf?sequence=1&isAllowed=yvergleichbar

negative expectations of a particular stimulus or situation lead to the perception of negative effects, even if there is no direct physical cause)

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

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

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 or animals can safely walk up to the base of the turbines.

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

The International Electrotechnical Commission (IEC) is a global organization that develops and publishes international standards for electrical and electronic technologies. One of the areas where the IEC has played a significant role is in the standardization of wind turbines. The IEC has developed a series of standards specifically for wind turbines, which cover various aspects such as design, testing, and performance. The IEC 61400-1 "Wind turbines – Part 1: Design requirements"⁵¹ 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.

Turbine blades are manufactured of fiberglass. Each turbine will incorporate lightning protection conduits which 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.

⁵¹ IEC 61400-1 (2005). Available at: <https://dlbargh.ir/mbayat/46.pdf>

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)⁵² provides further practical information on EMF.

The lowest EMF frequency covered in the report is 110kV. The proposed underground cabling as part of the Proposed Project constitutes 33kV underground cables, and therefore the EMF from this infrastructure will be of an even lower magnitude.

Further details on the potential effects of electromagnetic interference to telecommunications and aviation are presented in 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' and the guidance listed in Section 1.3.3 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.

Chapter 5: Population and Human Health (including Shadow Flicker), Chapter 8: Land, Soils and Geology, Chapter 9: Hydrology and Hydrogeology, Chapter 10: Air Quality and Chapter 11: Climate, Chapter 12: Noise and Vibration and Chapter 15: Material Assets (Traffic and Transport) provide an assessment of the effects of the Proposed Project on these areas of consideration. There is the potential for negative effects on human health during the wind farm construction phase related to potential emissions to air of dust, potential emissions to land and water of hydrocarbons, release of potentially silt-laden runoff into watercourses and noise emissions.

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

As set out in Chapter 9, potential health effects are associated with negative effects on public and private water supplies and potential flooding. There are no mapped groundwater source protection areas in the area of the Site. The closest mapped group water scheme is the Kilmaley/Inagh GWS located 5km to the southeast of the Site. Public water supply surface water abstractions in this area include Lough Naminna (Inagh Kilmaley Group Water Scheme) and Doo Lough. Lough Naminna is located inland, approximately 5km east of the Site. Neither the Proposed Wind Farm Site nor Proposed Grid Connection Site drains into Lough Naminna.

Doo Lough is located approximately 3km to the south of the Site. Neither the Proposed Wind Farm Site nor Proposed Grid Connection Site drains into Doo Lough

⁵² *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.

Area G associated with Proposed Enhancement Site (hen harrier habitat enhancement, see Appendix 6-4 for further details) drains into Doo Lough via a headwater tributary of the Annageeragh River. Area G within the Proposed Enhancement Site, which has an area of 7.2ha within this catchment, is located 4km upstream of Doo Lough. However, due to the largely non-invasive nature of the Proposed Enhancement Site works the potential for effects on the water environment is low.

Chapter 9 Hydrology and Hydrogeology assess the potential for impact on public water supply and private wells during the construction, operation and decommissioning phases.

A site-specific Flood Risk Assessment (**Appendix 9-1**) has been carried out for the Proposed Project, summarised in Section 9.3.6. The lack of permanent built infrastructure encroachment into flood zones, combined with the assessment of changes in permeable surfaces (Section 9.5.3.1) demonstrates that the risk of the Proposed Project contributing to downstream flooding is imperceptible. On-site (construction, operation and decommissioning phase) drainage control measures will ensure no downstream increase in local flood risk.

The Proposed Project includes the development of a renewable energy project, a wind farm, capable of offsetting carbon emissions associated with the burning of fossil fuels. During the operational stage the 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.

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. Slieveacurry 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.

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

5.3.4.6 **Vulnerability of the Proposed Project to Natural Disasters and Major Accidents**

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

In the context of the 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 there is a low risk of peat

instability/failure at the Site (i.e. all elements of the Proposed Project, including the Proposed Enhancement Site (which is part of the Proposed Project but is included here for clarity) There are peat soils mapped and observed along the Proposed Grid Connection Site, however, due to the nature of the proposed works and the shallow peat depths along the Proposed Grid Connection Site (<0.3m) there is no risk of peat instability along the Proposed Grid Connection Site. 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: Hydrology and Hydrogeology, with the risk being limited due to the proposed mitigation measures and site drainage plan, meaning there is limited risk to human health. It is considered that the risk of significant fire occurring, affecting the wind farm and causing the wind farm to have significant environmental effects is limited and therefore a significant effect on human health is similarly limited. As described earlier, there are no significant sources of pollution in the Proposed Wind Farm Site with the potential to cause environmental or health effects. Also, the spacing of the Proposed Turbines and distance of turbines from any properties limits the potential for effects on human health. The issue of turbine safety is addressed in Section 5.3.4.3

Major industrial accidents involving dangerous substances pose a significant threat to humans and the environment; such accidents can give rise to serious injury to people or serious damage to the environment, both on and off the site of the accident. The Site is not regulated under the Control of Major Accident Hazards Involving Dangerous Substances Regulations i.e. SEVESO sites and so there are no potential effects from this source. The nearest SEVESO site is over 25km from the Site and, is ESB Moneypoint, Carrowdotia, Killimer, Kilrush, Co.Clare.

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*’.⁵³ 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 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

⁵³ 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>>

Laboratory (LBNL) for the U.S Department of Energy⁵⁴. This study collected data on almost 7,500 sales of single-family homes situated within ten miles of 24 existing wind farms in nine different American states over a period of approximately ten years. The conclusions of the study are drawn from eight different pricing models including repeat sales and volume sales models. Each of the homes included in the study were visited to demonstrate the degree to which the wind facility was visible at the time of the sale, and the conclusions of the report state that *“The result is the most comprehensive and data rich analysis to date on the potential impacts of wind energy projects on nearby property values.”*

The main conclusion of this study is as follows:

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

This study has been updated by LBNL who published a further paper entitled *“A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States”*, in August 2013⁵⁵. This study analysed more than 50,000 home sales near 67 wind farms in 27 counties across nine U.S. states yet was unable to uncover any impacts to nearby home property values. The homes were all within 10 miles of the wind energy facilities - about 1,100 homes were within 1 mile, with 331 within half a mile. The report is therefore based on a very large sample and represents an extremely robust assessment of the impacts of wind farm development on property values. It concludes that:

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

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

In September 2023, the Energy Policy Journal published *‘Commercial wind turbines and residential home values: new evidence from the universe of land-based wind projects in the United States.’*⁵⁶ 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.

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.

⁵⁴ 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>

⁵⁵ LBNL (2013) *A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States*. Available at: <https://emp.lbl.gov/publications/spatial-hedonic-analysis-effects-wind>

⁵⁶ 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>

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*’⁵⁷ 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)⁵⁸ 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. A copy of the report is included as Appendix 5-2 of this EIAR.

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 change in price of properties close to wind farm developments, and that generally the county-wide property market drives local house prices, not the presence or absence of wind farms. This literature is contradictory to the working paper containing the only Irish study on the topic.

The literature described above demonstrates that there is insufficient evidence from the scientific literature and studies conducted to determine that there is the potential for a significant effect on property values as a result of the Proposed Wind Farm.

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 use⁵⁹ were to:

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

⁵⁷ RenewableUK, Cebr (2014) *The Effect of Wind Farms on House Prices*. Available at:

https://tethys.pnnl.gov/sites/default/files/publications/RenewableUK_2014.pdf

⁵⁸ Climate Exchange (2016) *Impact of wind Turbines on House Prices in Scotland*. Available at:

https://www.climateexchange.org.uk/wp-content/uploads/2023/09/cxc_wind_farms_impact_on_house_prices_final_17_oct_2016.pdf

⁵⁹ 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 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 Site will have a significant effect on property values

5.3.5.3 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 Site 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 County Clare, approx. 7km south of Ennistimon, Co. Clare and 8km west of Inagh, Co. Clare. The town of Miltown Malbay is located approx. 5.8km east of the nearest proposed turbine (T07). Current land-use on the Site comprises coniferous forestry, agriculture, turf cutting, existing renewable energy infrastructure and public road corridor. Land-use in the wider landscape comprises a mix of agriculture, low density housing, renewable energy and commercial forestry. Existing access is via forestry tracks off the L-6230 Local Road to the northwest of the Site.

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 5.9 refers to shadow flicker, Chapter 12 addresses noise and vibration). A comprehensive landscape and visual impact assessment have also been carried out, as presented in Chapter 14 of this EIAR. Impacts on the local population during the construction, operational and decommissioning phases of the Proposed Project is assessed in relation to each of these key topics and other environmental factors such as noise, traffic, and dust; see impacts in Section 5.4 below. The impact on residential amenity is then derived from an overall judgement of the combination of impacts due to shadow flicker, changes to land-use and visual amenity, noise, traffic, dust and general disturbance.

There are 25 no. sensitive receptors located within 1 kilometre of the Proposed Turbines. Of these 25 no. sensitive receptors, 12 no. are involved landowners. All involved and non-involved sensitive receptors achieve the minimum distance of 500m from any proposed turbine in compliance with the Guidelines (DoEHLG, 2006).

CAP25 was published in April 2025 by the Department of Environment, Climate and Communications. The associated Annex of Actions (Action EL/24/5) identifies the aim of publishing revised onshore wind energy guidelines in Q1 2025. At time of writing, the Draft Guidelines (DoHPLG, 2019) have not yet been adopted, and the relevant guidelines for the purposes of section 28 of the Planning and Development Act 2000, as amended, remain to be the Guidelines (DoEHLG, 2006). Notwithstanding

this, however, due to the timelines associated with the planning process for renewable energy projects and the commitment within the CAP25 to publish new wind energy guidelines for onshore wind in Q1 2025 it is possible that the Draft Guidelines (DoHPLG, 2019) may be adopted during the consideration period for the current planning application. Without benefit of the revised wind energy development guidelines for onshore wind, 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.

5.3.6 Shadow Flicker Assessment Results

5.3.6.1 Daily and Annual Shadow Flicker

The 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 a theoretical precautionary scenario. Following the detail provided above on sunshine hours, a sunshine factor of 30.56% 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 500 metres of a Proposed Turbine should not exceed a total of 30 minutes per day or 30 hours per year. As detailed in Section 5.2.3.5 there are no third-party inhabitable dwellings (hereafter referred to as sensitive receptors) less than 500 metres from the Proposed Turbines.

The predicted shadow flicker levels have been modelled for all 74 no. properties located within the Shadow Flicker Study Area. The predicted shadow flicker model results indicate:

- 21 properties are theoretically predicted to experience zero shadow flicker;
- 53 properties are theoretically predicted to experience some shadow flicker;
 - Of the 53 properties, 28 properties are theoretically predicted to experience shadow flicker that exceeds the Guideline thresholds for daily and/or annual shadow flicker. It should be noted that of these 28 properties, 6 no. are in derelict condition and 11 no. are involved landowners (including 4 no. of the derelict properties). As a result, no mitigation measures are required for these 13 no. properties.
 - In total, 15 no. sensitive receptors are theoretically predicted to experience shadow flicker that exceeds the Guideline thresholds for daily and/or annual shadow flicker. Please see Table 5-9 below for details.

- The annual threshold of over 30 hours for shadow flicker (Guidelines) is predicted to be exceeded at 6 properties once the regional sunshine average factor of 30.56% has been considered. It should be noted that 3 of these 6 properties are involved landowners.

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

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 wind turbines.

Section 5.4.3.2.8 below details the mitigation measures which will be employed at the potentially affected properties to ensure that the current adopted Guidelines (DoEHLG, 2006) are complied with at any property within the Shadow Flicker Study Area. The same mitigation measures (with stricter implementation of shadow flicker controls) can be implemented so that that the Proposed Turbines can be operated in accordance with the shadow flicker requirements of the Draft Guidelines (DoHPLG, 2019), should they be adopted as currently proposed, while the planning application is being determined.

Table 5-9 Maximum Potential Daily & Annual Shadow Flicker – Proposed Slievecurry Renewable Energy Development, Co. Clare.

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	Mitigation Strategy Required (Daily)	Mitigation Strategy Required (Annual)
H033*	512883	681128	Dwelling	529	T2	01:26:00	179:48:00	54:56:20	T1, T2, T4, T5	Yes	Yes
H199	513358	680234	Derelict	578	T5	00:33:00	24:14:00	7:24:17	T6	Yes	No
H023*	513394	680942	Dwelling	694	T5	00:48:00	38:15:00	11:41:15	T5	Yes	No
H021*	510900	679953	Dwelling	701	T3	00:43:00	122:24:00	37:24:00	T3, T6, T7, T9	Yes	Yes
H015	511947	681473	Dwelling	721	T1	01:24:00	106:56:00	32:40:27	T1, T2, T5	Yes	Yes
H200	513124	679838	Dwelling	726	T5	00:46:00	73:00:00	22:18:20	T6, T9	Yes	No
H035*	513408	680033	Derelict	734	T5	00:00:00	0:00:00	0:00:00	N/A	No	No
H039	513135	679825	Dwelling	742	T5	00:46:00	72:27:00	22:08:15	T6, T9	Yes	No
H058	510961	678680	Dwelling	742	T7	00:00:00	0:00:00	0:00:00	N/A	No	No
H067	512875	681435	Dwelling	748	T2	01:05:00	91:06:00	27:50:10	T1, T2, T4, T5	Yes	No
H012	511286	681320	Dwelling	755	T1	01:00:00	102:34:00	31:20:23	T1, T3, T4	Yes	Yes
H020	512121	681532	Dwelling	791	T2	01:55:00	119:43:00	36:34:48	T1, T2	Yes	Yes
H046*	512787	679131	Derelict	816	T6	00:51:00	75:56:00	23:12:07	T8	Yes	No
H040	513196	679763	Dwelling	809	T6	00:43:00	70:59:00	21:41:22	T6	Yes	No
H206*	512820	679156	Derelict	812	T6	00:46:00	80:40:00	24:38:53	T8, T9	Yes	No
H057	510955	678584	Dwelling	816	T7	00:00:00	0:00:00	0:00:00	N/A	No	No
H022*	513494	681026	Dwelling	824	T5	00:42:00	40:35:00	12:24:02	T2, T5	Yes	No
H019	512018	681562	Dwelling	824	T1	01:35:00	98:12:00	30:00:20	T1, T2, T5	Yes	Yes
H207*	512834	679145	Derelict	828	T6	00:41:00	67:50:00	20:43:37	T8, T9	Yes	No
H018	511977	681591	Dwelling	843	T1	01:22:00	84:25:00	25:47:38	T1, T2, T5	Yes	No
H016	511914	681606	Dwelling	847	T1	01:02:00	73:32:00	22:28:07	T1, T2, T5	Yes	No

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 Daly Shadow Flicker Exceedance	Mitigation Strategy Required (Daily)	Mitigation Strategy Required (Annual)
H005	510730	680605	Derelict	852	T3	01:04:00	68:38:00	20:58:17	T1, T3, T4	Yes	No
H056	510923	678542	Dwelling	869	T7	00:00:00	0:00:00	0:00:00	N/A	No	No
H006	510770	680743	Dwelling	878	T3	00:58:00	71:44:00	21:55:07	T1, T3, T4	Yes	No
H61	510655	679499	Dwelling	884	T7	00:38:00	55:41:00	17:00:52	T7, T9	Yes	No
H48*	512160	678577	Dwelling	889	T8	00:00:00	0:00:00	0:00:00	N/A	No	No
H085	510904	678525	Derelict	894	T7	00:00:00	0:00:00	0:00:00	N/A	No	No
H008	510938	681006	Dwelling	895	T1	00:44:00	89:11:00	27:15:02	T1, T3, T4, T9	Yes	No
H045*	512975	679142	Derelict	914	T6	00:34:00	38:40:00	11:48:53	T8	Yes	No
H047*	512623	678763	Dwelling	931	T8	00:00:00	0:00:00	0:00:00	N/A	No	No
H059	510573	678899	Dwelling	964	T7	00:38:00	48:45:00	14:53:45	T7	Yes	No
H044*	512843	678925	Dwelling	997	T8	00:11:00	3:30:00	1:04:10	N/A	No	No
H026	511473	681721	Dwelling	1009	T1	00:27:00	22:22:00	6:50:03	N/A	No	No
H001*	512959	681692	Dwelling	1011	T2	00:44:00	54:56:00	16:47:07	T1, T2, T5	Yes	No
H013	511498	681770	Dwelling	1048	T1	00:27:00	20:00:00	6:06:40	N/A	No	No
H010*	510947	681400	Dwelling	1062	T1	00:34:00	28:57:00	8:50:45	T1	Yes	No
H050*	512076	678307	Dwelling	1072	T7	00:00:00	0:00:00	0:00:00	N/A	No	No
H049*	512128	678331	Dwelling	1082	T7	00:00:00	0:00:00	0:00:00	N/A	No	No
H014	511486	681803	Dwelling	1083	T1	00:27:00	20:27:00	6:14:55	N/A	No	No
H062*	510401	679349	Dwelling	1096	T7	00:31:00	31:09:00	9:31:05	T7	Yes	No
H011	510885	681380	Dwelling	1102	T1	00:32:00	28:42:00	8:46:10	T1	Yes	No
H051*	511589	678103	Dwelling	1105	T7	00:00:00	0:00:00	0:00:00	N/A	No	No
H052*	511392	678086	Dwelling	1121	T7	00:00:00	0:00:00	0:00:00	N/A	No	No

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 Daly Shadow Flicker Exceedance	Mitigation Strategy Required (Daily)	Mitigation Strategy Required (Annual)
H003	510356	680257	Dwelling	1163	T3	00:30:00	15:25:00	4:42:38	T3	No	No
H053*	511320	678044	Dwelling	1171	T7	00:00:00	0:00:00	0:00:00	N/A	No	No
H208*	512255	681989	Derelict	1191	T2	00:00:00	0:00:00	0:00:00	N/A	No	No
H003	510316	680500	Dwelling	1222	T3	00:29:00	12:52:00	3:55:53	N/A	No	No
H031*	513205	678918	Dwelling	1233	T6	00:28:00	22:17:00	6:48:32	N/A	No	No
H038	513819	679734	Dwelling	1241	T5	00:24:00	10:27:00	3:11:35	N/A	No	No
H054	511020	678050	Dwelling	1244	T7	00:00:00	0:00:00	0:00:00	N/A	No	No
H063*	510216	679245	Dwelling	1272	T7	00:27:00	12:44:00	3:53:27	N/A	No	No
H032	510982	678011	Dwelling	1295	T7	00:00:00	0:00:00	0:00:00	N/A	No	No
H066	513085	681948	Dwelling	1296	T2	00:28:00	19:06:00	5:50:10	N/A	No	No
H042*	513637	679436	Dwelling	1311	T6	00:28:00	17:00:00	5:11:40	N/A	No	No
H030	514177	680393	Church	1331	T5	00:26:00	12:12:00	3:43:40	N/A	No	No
H209	513416	678991	Derelict	1334	T6	00:24:00	12:08:00	3:42:27	N/A	No	No
H064*	512920	682076	Dwelling	1343	T2	00:00:00	0:00:00	0:00:00	N/A	No	No
H55	510797	678048	Dwelling	1346	T7	00:00:00	0:00:00	0:00:00	N/A	No	No
H036	514131	680060	Dwelling	1357	T5	00:00:00	0:00:00	0:00:00	N/A	No	No
H065	510123	679050	Dwelling	1373	T7	00:26:00	12:09:00	3:42:45	N/A	No	No
H009	513335	681873	Dwelling	1375	T2	00:27:00	28:12:00	8:37:00	N/A	No	No
H060	510479	678248	Dwelling	1389	T7	00:00:00	0:00:00	0:00:00	N/A	No	No
H017	513918	681411	Dwelling	1396	T5	00:26:00	13:12:00	4:02:00	N/A	No	No
H028	514261	680402	School	1414	T5	00:25:00	10:31:00	3:12:48	N/A	No	No
H024	512990	682133	Dwelling	1422	T2	00:00:00	0:00:00	0:00:00	N/A	No	No

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 Daly Shadow Flicker Exceedance	Mitigation Strategy Required (Daily)	Mitigation Strategy Required (Annual)
H041	513819	679469	Dwelling	1422	T5	00:24:00	11:23:00	3:28:42	N/A	No	No
H043	513648	679167	Dwelling	1428	T6	00:26:00	28:37:00	8:44:38	N/A	No	No
H037	514099	679783	Dwelling	1445	T5	00:26:00	27:28:00	8:23:33	N/A	No	No
H201	510037	679237	Dwelling	1451	T7	00:24:00	9:41:00	2:57:32	N/A	No	No
H025	513545	681794	Dwelling	1459	T5	00:26:00	31:54:00	9:44:50	N/A	No	No
H032	514194	681136	Dwelling	1482	T5	00:24:00	9:29:00	2:53:52	N/A	No	No
H072	512190	682273	Derelict	1482	T2	00:00:00	0:00:00	0:00:00	N/A	No	No
H002	510037	680382	Dwelling	1485	T3	00:24:00	8:12:00	2:30:20	N/A	No	No
H074	514213	681116	Dwelling	1491	T5	00:23:00	9:14:00	2:49:17	N/A	No	No

*Involved landowners

5.3.6.2 Cumulative Shadow Flicker

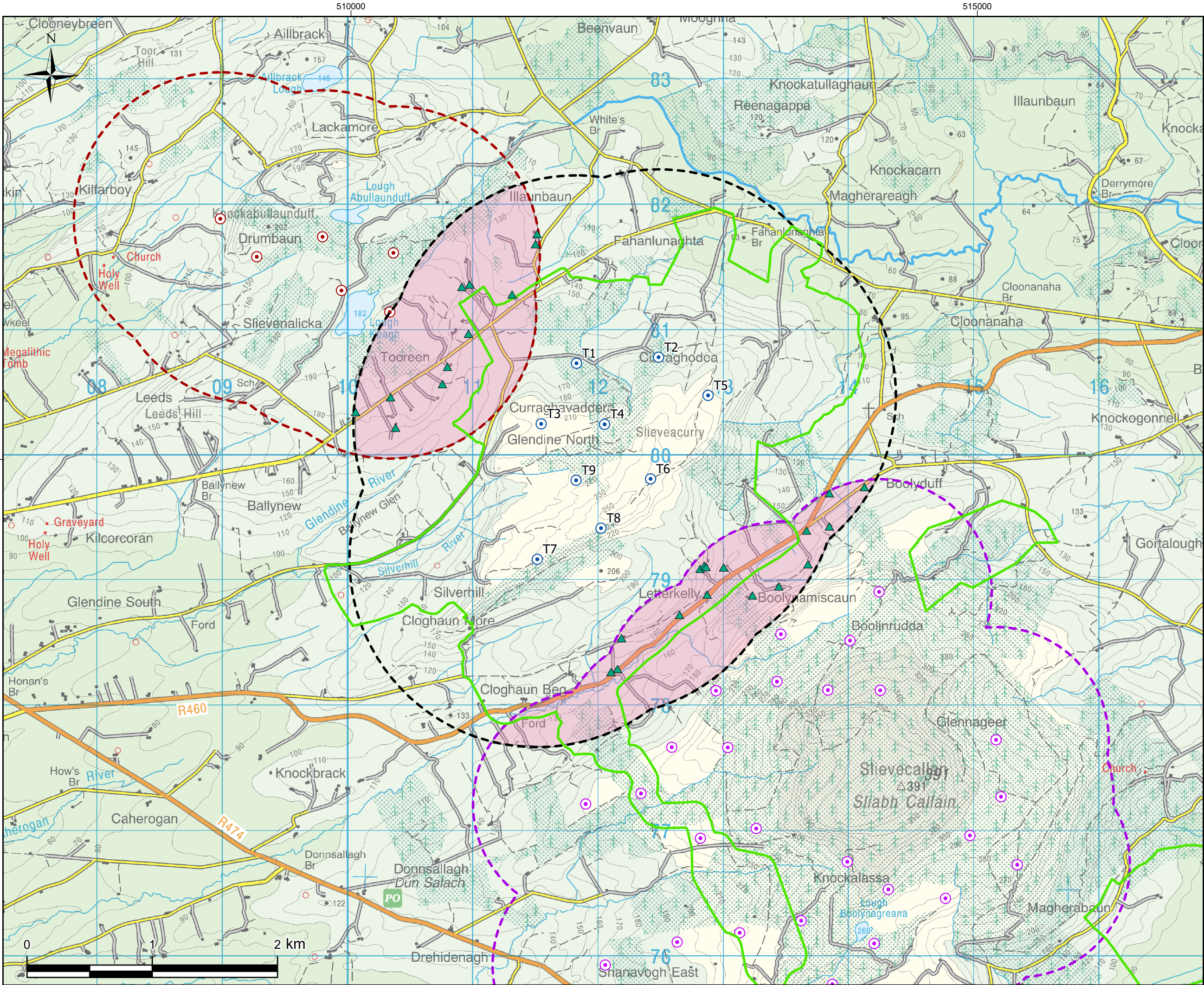
There are two existing, permitted, or proposed wind farms within 5km of the nearest turbine of the Proposed Project:

- the existing Slievecallan Wind Farm, located approximately 1.6km from the nearest Proposed Turbine;
- the proposed Illaunbaun Wind Farm, located approximately 1.5km from the Proposed Turbine.

The rotor diameter for the existing Slievecallan Wind Farm turbines is 90m with a corresponding shadow flicker study area for these turbines of 900m (10x rotor diameter). This area overlaps with the Shadow Flicker Study Area for the Proposed Project and so there is potential for cumulative shadow flicker effects in this instance. The rotor diameter for the proposed Illaunbaun Wind Farm turbines is 117m with a corresponding shadow flicker study area for these turbines of 1170m (10x rotor diameter). This area overlaps with the Shadow Flicker Study Area for the Proposed Project and so there is potential for cumulative shadow flicker effects in this instance.

The cumulative assessment of shadow flicker generated by the Proposed Project and the above relevant wind farms (included based on the overlap of their shadow flicker area with that of the Proposed Project Shadow Flicker Study Area (10x rotor diameter)) was carried out based on the methodology, assumptions and criteria outlined in Section 5.2.3 and Section 5.2.4.

Figure 5-5 illustrates the shadow flicker area.



Map Legend

- ElAR_Site_Boundary
- Proposed Turbine Locations
- Proposed Project Shadow Flicker Buffer
- Dwellings

Cumulative Wind Farms

- Slieveacallan Wind Farm
- Slieveacallan Shadow Flicker Buffer
- Illaunbaun Wind Farm
- Illaunbaun Shadow Flicker Buffer
- Cumulative Shadow Flicker Area

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

SITE LOCATION - NOT TO SCALE

Drawing Title
Cumulative Shadow Flicker Area

Project Title
Slieveacurry Renewable Energy Development

Project No. 240718	Drawing No. 5-8	Scale 1:28,000
Drawn By CF	Checked By BT	Date 14/04/2026

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

Table 5-10 Cumulative Shadow Flicker Results

House no.	ITM Coordinates (Easting)	ITM Coordinates (Northing)	Nearest Proposed Turbine No.	Distance to Nearest Turbine (metres)	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)	Turbine(s) contributing to Cumulative Shadow Flicker impact*	Further Assessment Required
H012	511286	681320	T1	755	01:00:00	133:05:00	40:39:52	T1, T2, T3, T4, Illaunbaun Wind Farm (T2, T6)	Yes
H046*	512787	679131	T6	816	00:51:00	88:04:00	26:54:33	T7, T8, T9, Slievecallan Wind Farm (T13)	Yes
H206*	512820	679156	T6	812	00:46:00	93:39:00	28:36:55	T7, T8, T9, Slievecallan Wind Farm (T13)	Yes
H207*	512834	679145	T6	828	00:41:00	81:06:00	24:46:50	T7, T8, T9, Slievecallan Wind Farm (T13)	Yes
H048*	512160	678577	T8	889	00:25:00	9:31:00	2:54:28	Slievecallan Wind Farm (T7)	No
H008	510938	681006	T1	895	00:56:00	139:25:00	42:35:58	T1, T3, T4, T9, Illaunbaun Wind Farm (T3, T6)	Yes
H045*	512975	679142	T6	914	00:34:00	56:06:00	17:08:30	T7, T8, T9, Slievecallan Wind Farm (T13)	Yes
H026	511473	681721	T1	1009	00:27:00	31:47:00	9:42:42	T1, T2, Illaunbaun Wind Farm (T2)	No
H013	511498	681770	T1	1048	00:27:00	28:50:00	8:48:37	T2, Illaunbaun Wind Farm (T2)	No
H010*	510947	681400	T1	1062	00:44:00	113:20:00	34:37:47	T1, T3, Illaunbaun Wind Farm (T2, T3 and T6)	Yes
H050*	512076	678307	T7	1072	00:28:00	27:51:00	8:30:35	Slievecallan Wind Farm (T4 and T7)	No
H049*	512128	678331	T7	1082	00:29:00	33:22:00	10:11:43	Slievecallan Wind Farm (T4 and T7)	No
H014	511486	681803	T1	1083	00:27:00	29:27:00	8:59:55	T2, Illaunbaun Wind Farm (T2)	No
H011	510885	681380	T1	1102	00:48:00	127:31:00	38:57:48	T1, T3, Illaunbaun Wind Farm (T2, T3, T6)	Yes
H051*	511589	678103	T7	1105	00:17:00	6:10:00	1:53:03	Slievecallan Wind Farm (T1)	No
H031*	513205	678918	T6	1233	00:57:00	103:23:00	31:35:22	T8, Slievecallan Wind Farm (T12, T13 and T19)	Yes
H038	513819	679734	T5	1241	00:25:00	29:40:00	9:03:53	T6, Slievecallan Wind Farm (T21)	No
H042*	513637	679436	T6	1311	00:28:00	43:49:00	13:23:18	T6, Slievecallan Wind Farm (T13, T21)	No
H209	513416	678991	T6	1334	00:52:00	94:58:00	29:01:03	T8, Slievecallan Wind Farm (T12, T13, T19, T21)	Yes

House no.	ITM Coordinates (Easting)	ITM Coordinates (Northing)	Nearest Proposed Turbine No.	Distance to Nearest Turbine (metres)	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)	Turbine(s) contributing to Cumulative Shadow Flicker impact*	Further Assessment Required
H041	513819	679469	T5	1422	00:31:00	31:06:00	9:30:10	T6, Slievecallan Wind Farm (T21)	Yes
H043	513648	679167	T6	1428	00:38:00	95:12:00	29:05:20	T6, Slievecallan Wind Farm (T13, T19, T21)	Yes
H037	514099	679783	T5	1445	00:26:00	42:45:00	13:03:45	T5, Slievecallan Wind Farm (T21)	No

*Involved landowners

Of the 22 no. properties with the potential for a cumulative impact to arise, Table 5-10 above illustrates that 12 no. properties warrant further assessment, Of these 12 properties, 6 no. are derelict properties and 6 no. are involved landowners (including 4 no. of the derelict properties). Therefore 4 no. sensitive receptors have been included for further assessment.

Table 5-11 also shows that there is overlap on a number of days, when shadow flicker is predicted to arise from the Proposed Project and the Slievecallan Wind Farm and the Illaunbaun Wind Farm. On this basis, there is potential for cumulative daily shadow flicker impact. Section 5.5.1.8 outlines the mitigation strategies which will be employed at the potentially affected properties to ensure the daily shadow flicker threshold will not be exceeded for the houses in question

Table 5-11 Potential Cumulative Impact from the Proposed Project and Nearby Wind Farms/Turbines

Property No.	Max. Potential Daily Shadow Flicker: Pre-Mitigation (hrs:min:sec)	Turbine(s) contributing to Cumulative Shadow Flicker impact	No. of Days 30min/day Threshold is Exceeded by Proposed Project, Slievecallan Wind Farm and Illaunbaun Wind Farm	No. of Days 30min/day Threshold is Exceeded by Proposed Project	No. of Days 30min/day Threshold is Exceeded by Slievecallan Wind Farm and Illaunbaun Wind Farm	No. of Days where any levels of Shadow Flicker produced by the Proposed Project overlaps with that of Slievecallan Wind Farm and Illaunbaun Wind Farm	Mitigation Required by Proposed Project
H012	01:00:00	T1, T2, T3, T4, Illaunbaun Wind Farm (T2, T6)	107	107	0	0	No, there are no days that overlap
H008	00:56:00	T1, T3, T4, T9, Illaunbaun Wind Farm (T3, T6)	148	92	56	0	No, there are no days that overlap
H011	00:48:00	T1, T3, Illaunbaun Wind Farm (T2, T3, T6)	119	8	111	0	No, there are no days that overlap
H041	00:31:00	T6, Slievecallan Wind Farm (T21)	16	0	16	0	No, there are no days that overlap

5.4 Likely Significant Effects and Associated Mitigation Measures

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

5.4.1 '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 Clare'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

5.4.2 Construction Phase

5.4.2.1 Population

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 effect on the population of the area in terms of changes to the population trends or density, household size or age structure.

5.4.2.1.1 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 Effects

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.

5.4.2.1.2 **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 all elements of the Proposed Project concurrently which would require approximately 70 employees in total, with the majority of these roles focused on the construction phase of the Proposed Wind Farm Site. The construction phase of the wind farm will last between 18-24 months. Many construction workers and materials will be sourced locally, thereby helping to sustain employment in the construction trade. This will have a short-term moderate positive impact.

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 race to achieve the targets set out in CAP25 accelerates.

Mitigation and Monitoring Measures

No mitigation required.

Residual Effects

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 local retailers and businesses experiencing a short-term positive effect on their cash flow. This will have a short-term moderate positive indirect residual effect.

Significance of Effects

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

5.4.2.1.3 **Land Use Patterns & Activities**

Pre-Mitigation Impacts

Current land-use on the Site comprises coniferous forestry, agriculture, turf cutting and public road corridor. Land-use in the wider landscape comprises a mix of agriculture, low density housing, renewable energy and commercial forestry.

During the construction phase there may be temporary interference with agricultural practices where farm practises may be redirected to other fields temporarily. As stated in Section 4.4.8 of Chapter 4, approximately 144ha (hectares) of forestry will be felled to accommodate the Proposed Project, 20.7ha

of which will be around the permanent built infrastructure of the Proposed Project and an additional 123.3ha as part of the BMEP.

The Proposed Grid Connection Site 33kV underground cabling exits the Proposed Wind Farm Site through forestry onto an existing private access tracks and the R460 before reaching the proposed extension to the existing 110kV Slievecallan substation. Local temporary traffic disruptions are likely along the Proposed Grid Connection Site; however, once the construction of each element is complete traffic flow will resume as normal along public roads.

The Proposed Project will therefore have a short-term slight negative direct effect, which is not significant, on land use.

Potential impacts related to traffic and transport during the construction phase are assessed in Section 5.4.2.2.5 below and in Section 15.1.13.2 of Chapter 15 of this EIAR.

Mitigation and Monitoring Measures

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

- The construction of the Proposed Grid Connection Site 33kV underground cabling will be undertaken in a rolling construction method with 100m of road constructed and back filled each day providing access in the evenings and night hours along the Proposed Grid Connection Site.
- A Traffic Management Plan, agreed with the Local Authority, will be in place for the construction phase of the Proposed Grid Connection underground cabling route. The Traffic Management Plan is included as Appendix 15-2 to this EIAR.
- The identified 20.7ha of coniferous forestry that will be permanently felled for the built infrastructure footprint of the Proposed Project, will be replaced or replanted on a hectare for hectare basis, and an additional 123.3ha will be permanently felled as part of the hen harrier enhancement plan included in Appendix 6-4 Biodiversity Management and Enhancement Plan (BMEP), which will be subject to the condition of any felling licence that will be issued in respect of the Proposed Project.

Residual Effects

Based on the above assessment, there will be a short-term, slight negative residual effect on land use.

Significance of Effects

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

5.4.2.1.4 **Property Values**

Pre-Mitigation Impacts

As noted in Section 5.3.5.1 above, the available scientific literature and studies conducted demonstrates that there is insufficient evidence 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 5.3.5.1, there is the potential for short-term slight negative impacts on property values, which is not significant, located within 1km of the Proposed Turbines during the construction phase of the Proposed Project.

As noted in Section 5.3.5 above, the conclusions from available EirGrid studies indicate that property values (residential and agricultural) show no correlation with the presence of grid infrastructure in the area, with opinions on nearby grid infrastructure diminishing over time. In some cases, property values were demonstrated to increase however, causation with grid infrastructure cannot be determined. Therefore, there is no potential for the Proposed Grid Connection Site to impact on property values in the area.

Mitigation and Monitoring Measures

- All mitigation relevant to property values, outlined above and the corresponding chapters: Chapter 10 Air, Chapter 12 Noise and Vibration, Chapter 13 Landscape, and Chapter 15 Material Assets, will be implemented in order to reduce insofar as possible, impacts on property values at properties located in the vicinity of 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), adhering to the required setback distances from sensitive receptors set out in those documents.

Residual Effects

With the above mitigation and monitoring measures adhered to, it can be concluded that there is the uncertain 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.

5.4.2.1.5 **Tourism**

Pre-Mitigation Impact

Given that there are currently no tourism attractions specifically pertaining to the Site there are no impacts on tourism associated with the construction phase of the Proposed Project.

The Proposed Wind Farm Site has some rural aesthetic qualities given the relative lack of buildings and infrastructure present on the Proposed Wind Farm Site. It is mostly pastoral agriculture and areas of forestry; however, these views are common throughout the local area and due to the Proposed Wind Farm Site's commercial forestry land-use, it is noted that the landscape has been subject to substantial levels of human interference and modification. Views from within the Proposed Wind Farm Site are generally contained given the surrounding topography and the treelines and hedgerows present on site.

The Proposed Grid Connection Site underground cabling route is located within the public road network and private lands, however, tourists seeking to travel to various attractions in the wider landscape during the construction phase, can utilise other routes and therefore will not be significantly impacted by the rolling construction phase of the underground cabling on the local road network, and the R460 regional road; please see Section 4.4.4 of Chapter 4 for further information on the proposed roads to be utilised for the Proposed Grid Connection Site 33kV underground cabling. However, should tourists want to utilise portions of any of this road, the laying of cables will be carried out in a rolling nature at an average rate of 100m to 150m of cabling being installed at any one time. The location of the construction works will be transient in nature with the extent of the section of road closed kept to a minimum.

With regard to tourist attractions and amenity use surrounding the Site, described in Section 5.3.2 above, traffic management safety measures will be in place, where required. Please see Section 5.4.2.2.5 below for traffic impact mitigation measures and Section 15.1.13.2 of Chapter 15 Material Assets for mitigation measures relating to the Proposed Wind Farm Site.

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 5.4.2.2.5 below outlines the mitigation measures proposed in relation to traffic. 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 effects 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.

5.4.2.1.6 **Residential Amenity**

Pre-Mitigation Impact

The potential for impacts on residential amenity is discussed in Section 5.3.5.3 above. There is the potential for impacts on residential amenity during the construction phase of the Project due to air, traffic, noise and vibration emissions due to the presence of additional traffic and plant machinery. A section of approximately 1.55km of the proposed 33kV underground cabling will be located within the R460 regional road, this has the potential to give rise to traffic disruptions. Dust emissions will have a short-term slight negative impact. Noise and vibration emissions will have a short-term moderate negative impact. Traffic will have a short-term moderate negative impact.

Mitigation and Monitoring Measures

All mitigation as outlined above and the corresponding chapters: Chapter 10 Air Quality, Chapter 12 Noise and Vibration, and Chapter 15 Material Assets will be implemented in order to reduce insofar as possible, impacts on residential amenity at properties located in the vicinity of 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 construction phase the Proposed Project is Not Significant.

5.4.2.2 Health

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

5.4.2.2.1 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. The construction of the Proposed Grid Connection Site will include working along a local road which may give rise to traffic impacts. Furthermore, working in proximity traffic flow is potential health and safety hazard for construction workers. This will have a short-term potential significant negative impact on health and safety.

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 (Work at Height) Regulations 2006 (S.I. No. 318 of 2006).

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

- A Health and Safety Plan covering all aspects of the construction process will address the Health and Safety requirements in detail. This will be prepared on a preliminary basis at the procurement stage and developed further at construction stage.
- All hazards will be identified, and risks assessed. Where elimination of the risk is not feasible, appropriate mitigation and/or control measures will be established. The contractor will be obliged under the construction contract and current health and safety legislation to adequately provide for all hazards and risks associated with the construction phase of the project. Safepass registration cards are required for all construction, delivery and security staff. Construction operatives will hold a valid Construction Skills Certificate Scheme card where required. The developer is required to ensure a competent contractor is appointed to carry out the construction works. The contractor will be responsible for the implementation of procedures outlined in the Safety and Health Plan. Public safety will be addressed by restricting Site access during construction. Fencing will be erected in areas of the Site where uncontrolled access is not permitted.
- Goal posts will be established, where necessary, under overhead electricity lines for the entirety of the construction phase of the Proposed Wind Farm Site.
- The suitability of machinery and equipment for use near power lines will be risk assessed.
- All staff will be trained on operating voltages of overhead electricity lines running through 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) Regulations 2021'⁶⁰. 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 necessitates that a Project Supervisor Design Process (PSDP) and Project Supervisor Construction Stage (PSCS) are required to be appointed in accordance with the provisions of the Health & Safety Authority's 'Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2013'. The PSDP appointed for the construction stage shall be required to perform his/her duties as prescribed in the Safety, Health and Welfare at Work (Construction) Regulations. These duties include (but are not limited to):

- 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;

⁶⁰ Health & Safety Authority (2013) Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2013. Available at: https://www.hsa.ie/eng/publications_and_forms/publications/construction/guidelines_on_the_procurement_design_and_management_requirements_of_the_safety_health_and_welfare_at_work_construction_regulations_2013_updated.pdf

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

Residual Effects

With consideration of the implementation of the detailed mitigation measures 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.

5.4.2.2.2 **Air Quality: Dust and Exhaust Emissions**

Pre-Mitigation Impacts

Potential dust and exhaust emission sources during the construction phase of the Proposed Project include upgrading of existing access tracks and construction of new access roads, turbine and meteorological mast foundations, temporary construction compounds, peat and spoil management areas, underground 33kV cabling and associated road upgrade works, 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 Proposed Wind Farm Site. The entry and exit of construction vehicles from the Proposed Wind Farm Site may result in the transfer of mud to the public road, particularly if the weather is wet. The section where the cable leaves existing private access tracks onto the R460 has the potential to result in the transfer of mud to the public road, particularly if the weather is wet. This may cause nuisance to road users and local residents.

These effects will have a short-term, slight, negative impact on air quality, which is not significant. The potential dust impacts that may occur during the construction phase of the Proposed Project are further described in Chapter 10: Air Quality.

Mitigation and Monitoring Measures

Truck wheels will be washed to remove mud and dirt before leaving. All plant and materials vehicles shall be stored in the compound area or other dedicated areas. Areas of excavation will be kept to a minimum, and stockpiling will be minimised by coordinating excavation, spreading and compaction. Construction traffic will be restricted to defined routes, and a speed limit will be implemented.

The active construction area along the proposed underground cabling route will be small, ranging from 100m in length at any one time. Should separate crews be used during the construction phase they will generally be separated by 1-2km. All construction machinery will be maintained in good operational order while on-site, minimising any emissions that are likely to arise. Aggregate materials for the construction of the cabling route will be sourced locally to reduce the amount of emissions associated

with vehicle movements. Potential dust emissions during the construction period will not be significant and will be relatively short-term in duration.

All mitigation as outlined in Chapter 10 Air Quality will be implemented in order to reduce insofar as possible, impacts on air quality in the vicinity of Proposed Project construction works.

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

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 not significant 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.

5.4.2.2.3 **Climate**

Chapter 11: Climate identifies, describes, and assesses the potential significant direct and indirect effects on climate arising from the Proposed Project.

Pre-Mitigation Impact

Proposed Project

Greenhouse gas emissions, e.g., carbon dioxide (CO₂), carbon monoxide and nitrogen oxides, associated with the production of construction materials, and operation of vehicles and plant will arise as a result of the construction activities. There will be a short-term, negative and slight only impact, which is Not Significant, given the quantity of greenhouse gases that will be emitted to the atmosphere and will be restricted to the duration of the construction phase. The potential climate impacts that may occur during the construction phase of the Proposed Project are further described in Chapter 11: Climate.

Mitigation Measures

All mitigation as outlined in Chapter 11: Climate will be implemented in order to reduce insofar as possible, impacts on climate 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

Following implementation of the mitigation measures identified in Chapter 11: Climate (Section 11.5.2), greenhouse gas emissions arising from the construction phase of the Proposed Project will have a negative, imperceptible, short-term residual effect. However, once emitted to the atmosphere, the greenhouse gas emissions that will arise from construction phase activities will have a negative, imperceptible, permanent residual effect on Climate, and is therefore Not Significant.

Significance of Effects

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

5.4.2.2.4 **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. Public water supply surface water abstractions in this area include Lough Naminna (Inagh Kilmaley Group Water Scheme) and Doo Lough. Lough Naminna is located inland, approximately 5km east of the Site. Neither the Proposed Wind Farm Site nor Proposed Grid Connection Site drains into Lough Naminna. Doo Lough is located approximately 3km to the south of the Site. Neither the Proposed Wind Farm Site nor Proposed Grid Connection Site drains into Doo Lough. However, Area G associated with Proposed Enhancement Site (hen harrier habitat enhancement, see Appendix 6-4 for further details) drains into Doo Lough via a headwater tributary of the Annageeragh River. The Proposed Enhancement Site, which has an area of 7.2ha within this catchment, is located 4km upstream of Doo Lough. Chapter 9 Hydrology and Hydrogeology assesses the potential for impact on group water schemes and other public water supplies during the construction phase. The pre-mitigation impact on water quality is assessed as negative, moderate, indirect, short term, unlikely effect on down gradient private water supplies.

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 4.6 in Chapter 4 for details on the different type of drainage measures to be implemented on the Site. Chapter 9 of this EIAR details all best practice and mitigation measures to minimise the potential for entrainment of suspended sediment or potential hydrocarbon leak. Please see Chapter 9 for details and Chapter 18 for a full list of mitigation and monitoring measures for the Proposed Project.

Residual Effects

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

Significance of Effects

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

5.4.2.2.5 **Noise and Vibration**

Pre-Mitigation Impacts

Proposed Wind Farm Site

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

These effects will be short-term in duration. The noisiest construction activities associated with wind farm development are excavation and concrete pouring of the turbine bases. Excavation of a turbine base can typically be completed in five days however, and the main concrete pour is usually conducted within one day.

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

Proposed Grid Connection Site

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 to the Proposed Grid Connection Site works. Please see Section 12.6.2.8 of Chapter 12 and Appendix 12-5 Tabulated Predicted Noise Results for the Proposed Grid Connection Site for further detail.

For the Proposed Grid Connection Site, the associated construction works will occur for short durations (rolling construction method, approximately 100m per day) at varying distances from NSLs. As the proposed underground cabling route is approximately 7.1km in length, it will take an estimated 71 days to construct the full length of the route. A review of the Proposed Grid Connection Site has identified that the nearest NSLs to the Proposed Grid Connection Site is H049 and is located at approximately 10 m.

The predicted construction phase noise levels at the closest NSLs, at distances within 40m and greater from works, are within the construction noise criterion of 70 dB $L_{Aeq,12hr}$. At shorter distances this criterion is exceeded; this would indicate a potential significant effect, however, taking into account that the proposed underground electrical cabling works will be undertaken in a rolling construction method with 100m of road constructed and back filled each day, the works will be close to any individual NSL for less than one day, after which the works are at greater distance from the NSL and therefore construction noise levels will be lower.

The predicted pre-mitigation noise impacts during the construction of the Proposed Grid Connection Site and associated infrastructure are assessed as negative, moderate and brief.

Mitigation and Monitoring Measures

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

- 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 is 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 12.6.1.1 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 out of these hours.

Residual Effects

With the implementation of the above mitigation measures, there will be a temporary, not significant, negative effect on health due to an increase in noise levels during the construction phase of the Proposed Project.

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.

5.4.2.2.6 **Traffic and Transport**

Pre-Mitigation Impact

Proposed Wind Farm Site

It is proposed that the large wind turbine components will be delivered from Port of Foynes to the Site via the M18, exiting at Junction 12 onto the N85 for 22.8km until reaching the village of Inagh. The turbine components will then turn on to the R460 travelling west along the regional road for approx. 4.2km, before turning onto the L1076 at Fahabeg. At Fahabeg, the turbines will be transported southwest for 2km after which the route will take a sharp left onto the L6230 local road approaching the Proposed Wind Farm Site from the northwest.. All deliveries of turbine components to the Site will follow this route. In addition, deliveries of concrete for the construction of the proposed turbine foundations will also use this access road at the north of the Proposed Wind Farm Site. The proposed turbine delivery route is described in further detail in Chapter 4: Description of the Proposed Project. Other non-turbine construction traffic e.g., Heavy Goods Vehicles (HGVs) and Light Goods Vehicles (LGVs) movements involved in the delivery of construction related materials to the Proposed Project will enter the Proposed Wind Farm Site at this entrance located off the L6230 to the north of the Site.

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

Proposed Grid Connection Site

Due to the nature of the Proposed Grid Connection Site 33kV underground cabling, the proposed works will be transient in nature along the public road network in which the works are proposed. As such, deliveries of construction materials will utilise the surrounding road network along the Proposed

Grid Connection Site as it moves along the public road network in which it's proposed. There is the potential for short term nuisance to local road users along the short section of cabling route located along the public road network, giving rise to a temporary slight negative impact, which is not significant. The Proposed Grid Connection Site underground cabling works will be completed with a traffic management plan in place and will follow the TII and ESNB requirements. The grid route trenches will be excavated in a rolling manner, approx. 100m to 150m per day and backfilled each evening.

Materials to be used to construct the extension to the existing onsite 110kV Slieveacallan substation will be delivered to the Site via the R460. This may have a negative temporary effect on existing road users, which will be minimised by the implementation of the mitigation measures included in the traffic management plan

By its nature the effects of the traffic volumes associated with the construction of the Proposed Grid Connection Site and diversions on the network will be transient, will be temporary and will be slight, which is not significant.

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. Local access to properties will also be maintained throughout any construction works and local residents will be supplied with the number of the works supervisor in order to ensure that disruption will be kept to a minimum. Please refer to Chapter 18 Schedule of Mitigation and Monitoring Measures for a full list of measures.

Residual Effects

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

Significance of Effects

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

5.4.2.2.7 Major Accidents and Natural Disasters

A risk register has been developed which contains all potentially relevant risks identified during the construction phase of the Proposed Project. Nine risks (Critical Infrastructure Emergencies, Severe Weather, Flooding, Peat Stability, Utility Emergencies, Traffic Incident, Contamination, Fire/Gas Explosion and Collapse/ damage to structures) specific to the construction phase have been identified and are presented in Chapter 16: Major Accidents and Natural Disasters. As outlined in 16.4.1.5 of this EIAR, the scenario with the highest risk score in terms of the occurrence of major accident and/or disaster during the construction is identified as 'Peat Stability', 'Contamination' of the Site and risk of 'Fire/Explosion' during construction. Therefore, in the absence of mitigation, the impact of Peat stability, contamination and major fires are considered unlikely, temporary, moderate, negative effects, which 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 Hydrology and Hydrogeology. The mitigation measures outlined in Chapter 8 and Chapter 9 to protect environmental receptors as well as the procedures and measures described in the CEMP will ensure that the risk from these sources is low.
- 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 ‘*A Framework for Major Emergency Management – A Guide to Regional Risk Assessment*’ (DoHLGH, 2024). It is considered that when the mitigation and monitoring measures outlined in the CEMP (Appendix 4-5) are implemented there will be temporary, slight, negative effect(s) 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.

5.4.2.2.8 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 of this chapter, can only occur during the operational phase of a wind energy project. There is therefore no shadow flicker impacts associated with the construction phase of the Proposed Project or the construction or operational phase of the Proposed Grid Connection Site. Any shadow flicker effects that occur in the commissioning phase of the proposed turbines will be short in duration and is dealt with under Section 5.4.3.2.8 below.

5.4.3 Operational Phase

5.4.3.1 Population

Those working on the operational phase of the Proposed Project will travel daily to the Site from the wider area. The operational phase will have no effect on the population of the area in terms of changes to the population trends or density, household size or age structure.

5.4.3.1.1 Population Levels

Pre-Mitigation Impacts

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.

Residual Effects

No residual effects.

Significance of Effects

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

5.4.3.1.2 Employment and Investment

Pre-Mitigation Impacts

The operational phase will present an opportunity for mechanical-electrical contractors and craftspeople to become involved with the maintenance and operation of the 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.

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

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

Mitigation and Monitoring Measures

No mitigation required.

Residual Effects

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

Significance of Effects

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

5.4.3.1.3 **Land Use Patterns and Activities**

Pre-Mitigation Impacts

The permanent built infrastructure footprint of the Proposed Project will occupy only a small percentage of the Site; 0.7% of the overall 1260-hectare site. Farming and commercial forestry practices will not be impacted during the operational phase. The addition of new roads throughout the Proposed Wind Farm Site will enable access for landowners throughout their lands. This will have a permanent, imperceptible positive impact on land use.

During the operational phase, farming and commercial forestry activities will resume around the proposed 33kV underground cabling to the proposed substation extension, and traffic movements on the R460 regional road will resume as normal. The small scale of the proposed underground cabling located primarily within the existing road corridor, and its ability to coexist with ongoing site activities and activities within the landscape indicate that the proposed 33kV underground cabling will have no significant impact on other land-uses within the Site and the wider area.

As detailed in the BMEP (Appendix 6-4) 123.3 ha of conifer forestry will be felled within the Proposed Enhancement Site for hen harrier habitat enhancement, as well as management of agricultural fields and grasslands for biodiversity enhancement. A long term, slight positive impact on land use and activities is associated with the Proposed Enhancement Site.

Mitigation and Monitoring Measures

No mitigation required.

Residual Effects

Due to the small permanent built infrastructure footprint of the Proposed Project on a site scale and even more so on a local scale, the residual effect is considered Long-Term, Slight, Positive 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.

5.4.3.1.4 **Property Values**

Pre-Mitigation Impacts

As noted in Section 5.3.5.1 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 long-term slight impacts on property values located within 1km of the Proposed Turbines during the early operational phase of the Proposed Project.

As noted in Section 5.3.5.2 above, the conclusions from available EirGrid studies indicate that property values (residential and agricultural) show no correlation with the presence of grid infrastructure in the area, with opinions on nearby grid infrastructure diminishing over time. In some cases, property values were demonstrated to increase however, causation with grid infrastructure cannot be determined. There is no potential for the Proposed Grid Connection Site 33kV underground cabling to impact on property values in the area.

Mitigation and Monitoring Measures

- All mitigation relevant to property values, outlined above and the corresponding chapters: Chapter 10 Air Quality, Chapter 12 Noise and Vibration, Chapter 13 Landscape, and Chapter 15 Material Assets, 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. 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 Effects

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

Significance of Effects

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

5.4.3.1.5 **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 identified tourist attraction is the Lahinch Beach, approximately 7.2km west from the Proposed Project.

Based on the literature review in Section 5.3.2.3 the majority of studies indicate that wind farm developments do not deter visitors to tourist attractions or scenic landscapes where turbines are visually evident. There are no impacts determined to arise.

Mitigation and Monitoring Measures

No mitigation required.

Residual Effects

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

Significance of Effects

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

5.4.3.1.6 **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 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), or the Draft Guidelines (DoHPLG, 2019) if adopted. The noise and vibration assessment is detailed in Chapter 12 of this EIAR. It should be noted that the Proposed Turbines will be brought in line 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 Project is addressed in Chapter 13: Landscape and Visual. The turbine locations have been designed to maximise turbine separation distances to dwellings in the area. There are no Proposed Turbines within 700m (4 x tip height) of any sensitive receptors. The proposed 33kV underground cabling is located underground; therefore, no residential amenity effects are deemed to arise from this element.

Impacts on telecommunications assets has 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 Wind Farm Site will have no impact on telecommunications.

Overall, without the implementation of mitigation measures there would be a long-term moderate, negative effect on residential amenity as a result of the Proposed Project.

Mitigation and Monitoring Measures

All mitigation as outlined under noise and vibration, dust, traffic, visual amenity, shadow flicker, and telecommunications in this EIAR will be implemented in order to reduce insofar as possible impacts on residential amenity at properties located in the vicinity of the Proposed Project works, including along the proposed turbine delivery route and construction materials haul route, Proposed Grid Connection Site and the Proposed Enhancement Site.

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

Residual Effects

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

Significance of Effects

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

5.4.3.2 **Health**

5.4.3.2.1 **Health and Safety**

Pre-Mitigation Impacts

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.

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 extension to the existing Slievecallan 110kV substation, which will be operated by EirGrid will be locked and fenced off from public access. The proposed substation extension 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, negative, imperceptible residual effect 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.

5.4.3.2.2 **Material Assets**

Pre-Mitigation Impacts

An assessment of potential effect of the Proposed Project on telecoms, aviation and built services (water, gas, and other underground services) has been assessed in Chapter.15 Material Assests. There is one Telecoms link that runs through the ELAR site boundary however it doesn't overlap with any proposed built infrastructure. The Proposed Project will have an long term, imperceptible negative impact on telecommunications.

Mitigation and Monitoring Measures

Please see Chapter 15, for 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 Proposed Project will have an long-term, imperceptible, negative impact on the telecommunications and aviation.

Significance of Effects

There is no anticipated effects on human health as a result of potential effects of the Proposed Project on telecoms, aviation and built services (water, gas, and other underground services). The effects are considered Not Significant

5.4.3.2.3 **Noise and Vibration**

Pre-Mitigation Impacts

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 Turbines will be within best practice noise criteria curves recommended in the Guidelines (DoEHLG 2006). Noise emissions from the operation of the substation extension will be Not Significant, the noise from the substation will be barely audible at the nearest receptor and inaudible at any other properties and will have no impact on the operation noise emissions from the Proposed Project. the level of noise from the Proposed Grid Connection Site 33kV underground cabling will be negligible and will only occur during maintenance or monitoring activities therefore, it is considered that a long-term, not significant, negative effect is associated with the Project.

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 is long-term, not significant, Negative.

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 Project can be satisfied. The effects are considered Not Significant

5.4.3.2.4 **Air Quality: Dust and Exhaust Emissions**

Pre-Mitigation Impacts

The Proposed Wind Farm Site will require daily visits of maintenance staff in LGVs and will produce dust and other emissions. Other sources of dust and other emissions generated during the operational phase will be from infrequent visits by maintenance staff to the Proposed Grid Connection Site in LGVs. The Proposed Project will generate electricity from a renewable source, contributing to a positive impact on air quality. 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 were generated by traditional fossil fuel plants. This is a long-term moderate positive effect on air quality.

Mitigation and Monitoring Measures

All mitigation as outlined in Section 10.3.3 of Chapter 10 Air Quality will be implemented in order to reduce insofar as possible, impacts on air quality in the vicinity of Proposed Project. Please refer to Ch. 18: Schedule of Mitigation and Monitoring Measures for a full list of measures.

Residual Effects

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 moderate positive effect on air quality.

Significance of Effects

Through the offsetting of dust and greenhouse gas emissions from fossil fuels during the operational phase, the Proposed Project is considered to have No Significant effects on air quality.

5.4.3.2.5 **Climate**

Pre-Mitigation Impact

Proposed Project

As detailed in Section 11.3.2.3 of Chapter 11: Climate, the EPA reported Ireland is not on track to meet the 51% emissions reduction target by 2030 (as compared to 2018 levels) based on most up to date EPA projections which include many of Climate Action Plan 2024 measures⁶¹. The first two carbon budgets (2021-2030), which aim to support achievement of the 51% emissions reduction goal, are projected to be exceeded by a significant margin. Carbon Budget 1 to be exceeded by a margin of 8 to 12 MtCO₂e. Carbon Budget 2 to be exceeded by a margin of 77 to 114 MtCO₂e (with carryover from Carbon Budget 1). From 10.6 MtCO₂e in 2018, emissions from the Energy Industries sector are projected to decrease to between 3.4 and 4.4 MtCO₂e in 2030 (a 59 to 68% reduction). Renewable energy generation at the end of the decade is projected to range from 69 to 68% of electricity generation. From 21.4 MtCO₂e in 2018, total emissions from the agriculture sector are projected to be between 18.0 and 21.6 MtCO₂e in 2030 (a 16% reduction in WAM and 1% increase in WEM). Transport emissions are projected to decrease from 12.3 MtCO₂e in 2018 to between 9.7 MtCO₂e and 11.2 MtCO₂e in 2030 (a 9 to 21% reduction). The EPA report highlights that whilst emissions are beginning to reduce, transformative measures will be needed to meet National Climate ambitions.

Ireland will therefore have to meet even more demanding climate change and renewable energy supply obligations in order to play its part in achieving the European climate and energy ambitions. As announced in December 2022, the Irish Government have pledged to generate 80% of the country's electricity supply from renewable sources by 2030⁶². The development of additional indigenous wind energy generating capacity, such as that proposed from the Proposed Wind Farm, will help to reduce carbon emissions and improve Ireland's security of energy supply.

The Proposed Project will offer significant benefits in terms of renewable energy production and reductions in greenhouse gas emissions and other air pollutants. In this regard, it will have a positive, moderate, long-term impact, which is Not Significant. The carbon loss and savings due to the Proposed Project are discussed in Section 11.5.2 of Chapter 11 of this EIAR.

Long-term imperceptible negative effects on climate are predicted in relation to the generation of additional traffic during the operational phase, in the form of light goods vehicles (LGV's) visiting the Site for inspections and maintenance, and in the form of public vehicle access to amenity car parks. Waste is not proposed to be generated onsite during the operational phase, any waste that does arise will be minimal and any impact will be short-term, negative and imperceptible, which is Not Significant.

Mitigation Measures

All mitigation as outlined in Chapter 11: Climate will be implemented in order to reduce insofar as possible, impacts on climate 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

It is estimated that the Proposed Project, with a potential installed capacity of 54 MW which will result in the net displacement of approximately 34,791 tonnes of Carbon Dioxide (CO₂) per annum (Against EU FFC). There will be positive, moderate, long-term residual effect, which is Not Significant, on CO₂ emissions and energy targets with the implementation of the Proposed Project.

Significance of Effects

The effect on climate due to the operation of the Proposed Project is Not Significant

⁶¹ EPA, 2025. Ireland's Provisional Greenhouse Gas Emissions 2024-2055 Available at: <https://www.epa.ie/publications/monitoring-assessment/climate-change/air-emissions/EPA-Provisional-1990-2024-GHG-Report-1716.pdf>

⁶² Department of the Environment, Climate and Communications (2025) Climate Action Plan 2025 < <https://www.gov.ie/en/department-of-climate-energy-and-the-environment/publications/climate-action-plan-2025/>>

5.4.3.2.6 **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 the site entrance, internal roads and hardstand areas. These works would be of a very minor scale and would be very infrequent. During such maintenance works there is a small risk associated with the release of hydrocarbons from site vehicles, although it is not envisaged that any significant refuelling works will be undertaken on Site during the operational phase. Therefore, there will be a negative, slight, indirect, temporary, unlikely impact on human health due to a potential deterioration of water quality.

Mitigation and Monitoring Measures

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

Residual Effects

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

Significance of Effects

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

5.4.3.2.7 **Traffic and Transport**

Pre-Mitigation Effect

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

All site visits for maintenance and inspection purposes for the Proposed Wind Farm Site will be done so via LGVs with one or two LGVs each day. The effects of the maintenance traffic on the surrounding highway network will therefore be imperceptible, negative and long term.

Mitigation and Monitoring Measures

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

Residual Effects

No residual effects.

Significance of Effects

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

5.4.3.2.8 **Major Accidents and Natural Disasters**

Pre-Mitigation Impacts

A risk register has been developed which contains all potentially relevant risks identified during the operational phase of the Proposed Project. 6 risks (Severe Weather, Flooding, Contamination, Fire/Gas Explosion, Collapse/damage to structures 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, which 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.
- 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).). There will be temporary, slight, negative effect(s) arising during operation of the Proposed Project.

Significance of Effects

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

5.4.3.2.9 **Shadow Flicker**

Pre-Mitigation Effect

Under a theoretical precautionary scenario, a total of 53 properties as a result of the Proposed Project may experience daily shadow flicker, 28 no. of which may experience in excess of the Guidelines threshold of 30 minutes per day. The Guidelines total annual guideline limit of 30 hours is predicted to

be exceeded at 6 no. sensitive receptors when the regional sunshine average of 30.56% is taken into account. As stated in Section 5.3.6, there are 74 no. properties located within 1.5km of the Proposed Turbines. Of the 28 no. properties predicted to experience daily shadow flicker in excess of the current Guidelines threshold of 30 minutes per day, 11 no. are involved landowners, and 6 no. are in derelict condition (4 no. of which is a Involved landowners. 15 no. sensitive receptors may be subject to mitigation measures in order to ensure the Guideline's 30-minute daily and/or 30-hour annual shadow flicker thresholds are not exceeded.

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. However, excluding these circumstances and 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 Mitigation Measures

Where daily or annual shadow flicker exceedances are predicted at any inhabitable or third-party dwelling of the identified 15 no. sensitive receptors, a site visit will be undertaken firstly to determine the presence of existing screening and window orientation at each potentially affected property. This will determine if the receptor has an actual line of sight to any turbine and actual potential for shadow flicker to occur. Once this exercise is completed and all of the potentially affected properties, the following measures will be employed.

Screening Measures

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

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

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

Wind Turbine Control Measures

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

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

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

All predicted incidents of shadow flicker can be pre-programmed into the wind farm's control software. The wind farm's SCADA control system can be programmed to shut down any particular turbine at any particular time on any given day to avoid excessive shadow flicker occurrences at properties which are not naturally screened or cannot be screened with measures outlined above. Where such wind turbine control measures are to be utilised, they need only be implemented when the specific

combined circumstances occur that are necessary to give rise to the shadow flicker effect in the first instance. Therefore, if the sun is not shining on a particular day that shadow flicker was predicted to occur at a nearby property, there would be no need to shut down the relevant turbines that would have given rise to the shadow flicker at the property. Similarly, if the wind speed was below the cut-in speed that caused the turbine rotor to rotate and give rise to a shadow flicker effect at a nearby property, there would be no need to shut down the relevant turbines that otherwise would have caused shadow flicker.

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

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

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

This method of shadow flicker mitigation has been technically well-proven at wind farms in Ireland and also in areas outside Ireland that experience significantly longer periods of direct sunlight. In order to demonstrate how the SCADA control system can be applied to switch off particular turbines at the relevant times and dates, Table 5-12 below lists the 15 no. sensitive receptors at which a shadow flicker mitigation strategy may be necessary to ensure the Guidelines 30-minute per day shadow flicker threshold is not exceeded. In this case, the relevant turbine(s) would be programmed to switch off for the time required to reduce daily shadow flicker to below the guideline limit of 30 minutes. The SCADA control system would be utilised to control shadow flicker in the absence of being able to agree alternative mitigation measures with the relevant property owner. The mitigation strategy outlined in Table 5-12 below is based on the theoretical precautionary scenario. The details presented in Table 5-12 list the days per year and the turbines that could be programmed to switch off at specific times, in order to reduce daily shadow flicker to a maximum of 28 minutes, which is below the guideline limit of 30 minutes.

Table 5-12 Shadow Flicker Mitigation Strategy for Daily Shadow Flicker Exceedance – Turbine Numbers and Days

Property No.	Max. Daily shadow Flicker: Pre-Mitigation (hrs:min:sec)	Max. Annual Shadow Flicker Adjusted for Average Regional Sunshine (hrs:min:sec)	No. of Days 30min/day Threshold is Exceeded	Turbine(s) Producing Shadow Flicker Exceedance	Days of Year When Mitigation May be Required (Day No's)*	Post-mitigation Maximum Daily Shadow Flicker (hrs:mins:sec)	Post-mitigation Maximum Annual Shadow Flicker (hrs:min:sec)
H039	00:38:00	17:00:52	50	T6,	99-123, 223-247	≤00:28:00	≤30:00:00
H040	00:44:00	27:15:02	46	T6	106-128, 218-240	≤00:28:00	≤30:00:00
H059	00:44:00	16:47:07	54	T8	128-155, 192-217	≤00:28:00	≤30:00:00
H061	00:34:00	8:50:45	30	T7	70-83, 128, 263-277	≤00:28:00	≤30:00:00
H067	00:31:00	9:31:05	103	T2, T5	1-42, 306-365	≤00:28:00	≤30:00:00
H006	00:48:00	11:41:15	47	T1, T3	45-61, 94-99, 247-252, 285-302	≤00:28:00	≤30:00:00
H008	00:43:00	32:40:27	80	T1, T3	10-35, 66-79, 268-280, 312-338	≤00:28:00	≤30:00:00
H011	00:46:00	22:18:20	9	T1, T3	40-43, 304-307	≤00:28:00	≤30:00:00
H012	00:46:00	22:08:15	69	T1	11-44, 303-337	≤00:28:00	≤30:00:00
H015	01:05:00	27:50:10	93	T1, T2	1-37, 310-365	≤00:28:00	≤30:00:00
H016	01:00:00	31:20:23	71	T2	1-26, 321-365	≤00:28:00	≤30:00:00
H019	00:42:00	40:35:00	59	T5, T2	42-58, 80-81, 265-267, 289-305	≤00:28:00	≤30:00:00
H018	01:55:00	36:34:48	67	T2	1-24, 323-365	≤00:28:00	≤30:00:00
H020	00:43:00	21:41:22	69	T1, T2	1- 25, 322-335	≤00:28:00	≤30:00:00
H200	01:02:00	22:28:07	50	T6	98-122, 224-248	≤00:28:00	≤30:00:00

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

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

Residual Effect

Following the implementation of the above suite of mitigation measures, the Guidelines limit of 30 mins per day or 30 hours per year will not be exceeded and this will result in a long-term, imperceptible negative residual effect from shadow flicker on human health.

Significance of Effects

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

5.4.3.3 Interference with Communications Systems and EMF

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

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

EMF along the Proposed Grid Connection Site is detailed in Section 15.2.3.4.1 in Chapter 15 Material Assets. The ESB 2017 document '*EMF & You: Information about Electric & Magnetic Fields and the electricity network in Ireland*', states that EMF from 110kV overhead lines and underground cables diminishes quickly with distance from the potential impacted receptor, with EMF from underground 110kV cables, diminishing from 4µT to 0.5µT at 10m away from the cable, reducing to almost 0µT at 20m. The Proposed Grid Connection Site constitutes 33kV cabling, and so the EMF from this kV infrastructure will be of an even lower magnitude.

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

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

5.4.4 Decommissioning Phase

The Proposed Turbines 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 Project may be decommissioned fully. The proposed substation extension will remain in place as it will form part of the national electricity grid under the control of ESBN / EirGrid.

The works required during the decommissioning phase are described in Section 4.12 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 (DP) 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 DP 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 principles that will inform the final decommissioning plan are contained in the Construction and Environmental Management Plan (CEMP) in Appendix 4-5.

5.5 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 assessment of potential cumulative effects of the Proposed Project and other relevant projects 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 Chapter 2: Background to the Proposed Project. The effects with the potential to have cumulative effects on population and human health are discussed below and in more detail in the relevant chapters: noise (Chapter 12), visual effects (Chapter 14) and traffic (Chapter 15).

5.5.1.1 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.

5.5.1.2 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. Wind farms are an existing feature in the surrounding landscape, which will assist in the assimilation of the Proposed Project into this environment. As also noted in Section 5.3.4.2 above, the conclusions from available research indicate there is a generally positive disposition among tourists towards wind developments in Ireland.

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 projects in the area.

5.5.1.3 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. In particular, the proposed Illaunbaun Wind Farm, located approx. 1.5km from the nearest Proposed Turbine. If construction occurs at the same time as the construction of the Proposed Project, there is potential for cumulative effects on traffic. There is the potential for temporary, slight, negative effects to arise as a result of the combination of the construction of the Proposed Project along with nearby cumulative permitted and proposed developments. However, the mitigation measures in relation to traffic set out in Section 5.4.2.2.5 above will ensure that any cumulative effects that arise will be temporary in duration and imperceptible in significance and therefore Not Significant.

During the construction phase there may be slight interference with commercial activities occurring at the Slievecallan Wind Farm and traffic may be redirected to other site entrances. This will have a short-term slight negative direct effect, which is not significant.

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

5.5.1.4 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.

During the construction phase of the Proposed Project and the construction phase of other Projects within 20 kilometres of the Proposed Project 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 and Section 10.3.3 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 Projects within 20 kilometres are such that, once operational, they will have a cumulative long-term, moderate, positive effect on the air quality and climate.

5.5.1.5 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 Project. 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 Projects in the area.

5.5.1.6 Property Values

As noted in Section 5.4.3.1.4 above, it can be concluded from available international literature that there is the potential for a short-term imperceptible negative not significant impact on property values within 1km of the Proposed Turbines. It is on this basis that it can be concluded that there would be a short-term imperceptible negative cumulative impact from the Proposed Project.

5.5.1.7 Services

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

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

5.5.1.8 Shadow Flicker

Pre-Mitigation Effect

The cumulative assessment of shadow flicker arising from the Proposed Project and other wind farms was carried out based on the methodology, assumptions and criteria outlined in Section 5.2.3 and Section 5.2.4.

For the assessment of cumulative shadow flicker, any other existing, permitted, or proposed wind farms are considered where the project's 10 times rotor diameter shadow flicker study area is located within the Shadow Flicker Study Area of 10 times the rotor diameter for the Proposed Project. In this case, the closest wind farm is the proposed Illaunbaun Wind Farm located approximately 1.5km northwest of the nearest Proposed Turbine. As such, the 10 times rotor diameter Shadow Flicker Study Area for this proposed development would overlap with that of the Proposed Project 10 times rotor diameter Shadow Flicker Study Area. The existing Slievecallan Wind Farm is also located within the 10 times rotor diameter Shadow Flicker Study Area as detailed in Section 5.3.6 above. The Slievecallan Wind Farm is located 1.6km from the nearest Proposed Turbine.

Of the 74 no. properties within the Shadow Flicker Study Area of the Proposed Project, 10 no. properties were identified for further assessment with regards to cumulative shadow flicker

Table 5-12 details the results of the Proposed Turbines being brought in line with the DoEHLG 2006 Guidelines limit of 30 hours per year through mitigation strategies outlined in Section 5.4.3.2.8. On this basis, there will be no significant cumulative shadow flicker effect.

As identified in 5-9 above, where there are daily shadow flicker occurrences, the culmination of these occurrences over a year correspond to annual shadow flicker occurrences at a given dwelling. Therefore, by presenting the maximum potential annual shadow flicker contributed by the Proposed Project after mitigation in Table 5-13 below, this also identified the culmination of daily shadow flicker occurrences over a year. As a result, Table 5-13 highlights only the cumulative annual shadow flicker occurrence.

Table 5-13 Cumulative Shadow Flicker Mitigation

House no.	Max. Potential Cumulative Annual Shadow Flicker: Pre-Mitigation (hrs:min:sec)	Max. Potential Annual Shadow Flicker Adjusted for Average Regional Sunshine (hrs:min:sec)	Turbine(s) contributing to Cumulative Shadow Flicker impact*	Max. Potential Annual Shadow Flicker contributed to by Proposed Project Adjusted for Average Regional Sunshine	Max. Potential Annual Shadow Flicker contributed by Slievecallan Wind Farm and Illaunbaun Wind Farm	Max. Potential Cumulative Annual Shadow Flicker Exceedance that requires mitigation (hrs:mins:sec)	Proposed Turbines to be controlled	Post-mitigation Maximum Annual Shadow Flicker by the Proposed Project (hrs:mins:sec)
H012	133:05:00	40:39:52	T1, T2, T3, T4, Illaunbaun Wind Farm (T2, T6)	31:20:23	9:19:28	10:39:52	T1, T2, T3, T4	≤30:00:00
H008	139:25:00	42:35:58	T1, T3, T4, T9, Illaunbaun Wind Farm (T3, T6)	27:15:02	15:20:57	12:35:58	T1,T3, T4, T9	≤30:00:00
H011	127:31:00	38:57:48	T1, T3, Illaunbaun Wind Farm (T2, T3, T6)	8:46:10	30:11:38	08:57:48	T8	≤30:00:00

5.5.1.9 Residential Amenity

Pre-Mitigation Impacts

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

The closest sensitive receptor is located approximately 720 metres from the nearest proposed turbine location. There are no sensitive receptors located closer than four times the maximum turbine tip height (i.e. within 700 metres) of the Proposed Turbines. (4 times tip height set back distance set out in the draft Guidelines). 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 effect on residential amenity during construction works. During the operational phase, noise and shadow flicker from the existing, proposed and permitted projects will be limited to below Guidelines (DoEHLG, 2006) levels, resulting in a long-term, not significant residual impact from on residential amenity.

Significance of Effects

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

5.6 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. 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

5.7

EIA Classification Summary

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

Table 5-14 Impact Assessment Classification Summary

Topic	Pre-Mitigation Effect	Mitigation Section Reference	Residual Effect	Significance
Construction Phase				
Population Levels	No identified impacts	Section 5.4.2.1. – No mitigation required	No identified impacts	Not Significant
Employment and Investment	Short-term, Moderate, Positive	Section 5.4.2.1.2	Short-term, Moderate, Positive	Not Significant
Land Use Patterns & Activities	Short-Term, Slight, Negative	Section 5.4.2.1.3	Short-Term, Slight, Negative	Not Significant
Property Values	Short-Term, Slight, Negative	Section 5.4.2.1.4	Short-Term, Imperceptible, Negative	Not Significant
Tourism	No identified impact	Section 5.4.2.1.5	No identified impact	Not Significant
Residential Amenity	Short-Term, Moderate, Negative	Section 5.4.2.1.6	Short-Term, Slight, Negative	Not Significant
Health & Safety	Short-term, Significant, Negative	Section 5.4.2.2.1	Short-Term, Slight, Negative	Not Significant
Air Quality: Dust and Exhaust Emissions	Short-Term, Slight, Negative	Section 5.4.2.2.2	Short-Term, Not Significant, Negative	Not Significant
Climate	Short-Term, Slight, Negative	Section 5.4.2.2.3	Permanent, Imperceptible, Negative	Not Significant
Water Quality	Sort-Term, Moderate, Negative	Section 5.4.2.2.4	Short-Term, Imperceptible, Negative	Not Significant
Noise and Vibration	Short-Term, Slight, Negative	Section 5.4.2.2.5	Temporary, Not Significant, Negative	Not Significant

Traffic and Transport	Temporary to Slight, Moderate, Negative	Section 5.4.2.2.6	Short-Term, Slight, Negative	Not Significant
Major Accidents and Natural Disasters	Temporary, Moderate, Negative	Section 5.4.2.2.7	Temporary, Slight, Negative	Not Significant
Shadow Flicker	N/A	N/A	N/A	N/A
Interference with Telecommunication Systems and EMF	N/A	N/A	N/A	N/A
Operational Phase				
Population Levels	No identified impacts	Section 5.4.3.1.1 – No mitigation required	No identified impacts	Not Significant
Employment and Investment	Long-Term, Slight, Positive	Section 5.4.3.1.2 – No mitigation required	Long-Term, Slight, Positive	Not Significant
Land Use Patterns and Activities	Long-Term, Slight, Negative	Section 5.4.3.1.3 – No mitigation required	Permanent, Slight, Negative	Not Significant
Property Values	Long-Term, Slight, Negative	Section 5.4.3.1.4	Long-Term, Not Significant, Negative	Not Significant
Tourism	No identified impact	Section 5.4.3.1.5 – No mitigation required	No identified impact	Not Significant
Residential Amenity	Long-Term, Moderate, Negative	Section 5.4.3.1.6	Long-Term, Slight, Negative	Not Significant
Health and Safety	Long-term, Slight, Negative	Section 5.4.3.2.1	Long-Term, Imperceptible, Negative	Not Significant
Material Assets	Long-Term, Imperceptible, Negative,	Section 5.4.3.2.1	Long-Term, Imperceptible, Negative,	Not Significant
Noise and Vibration	Long-Term, Not Significant, Negative	Section 5.4.3.2.3	Long-Term, Not Significant, Negative	Not Significant
Air Quality; Dust and Exhaust Emissions	Long-Term, Moderate, Positive	Section 5.4.3.2.4	Long-Term, Moderate, Positive	Not Significant

Climate	Long-Term, Moderate, Positive	Section 5.4.3.2.5	Long-term, Moderate, Positive	Not Significant
Water Quality	Temporary, Slight, Negative	Section 5.4.3.2.6	Temporary, Imperceptible, Negative	Not Significant
Traffic and Transport	Long-Term, Imperceptible, Negative	Section 5.4.3.2.7 – No mitigation required	No identified impact	Not Significant
Major Accidents and Natural Disasters	Temporary, Moderate, Negative	Section 5.4.3.2.8	Temporary, Slight, Negative	Not Significant
Shadow Flicker	Long-Term, Slight, Negative	Section 5.4.3.2.9	Long-Term, Imperceptible, Negative	Not Significant
Interference with Communication Systems and EMF	No identified impacts	Section 5.4.3.2.10	No identified impacts	Not Significant
Decommissioning Phase				
Population and Human Health	Any impact 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 lesser duration, and the mitigation measures outlined in Section 5.8.2 will be implemented during the decommissioning phase also	Section 5.4.2	N/A	N/A