Planning and Environmental Consultants

Environmental Impact Assessment Report (EIAR)

Crumhach Wind Farm, Co. Sligo

Chapter 5 – Population and Human Health

Table of Contents

GLOSSARY OF TERMS

Term	Definition
Shadow Flicker	A phenomenon when rotating wind turbine blades cast moving shadows over a narrow opening causing a rapidly alternating flickering light intensity
SEVESO site	Industrial facilities storing potentially dangerous substances in high quantities regulated under the EU SEVESO Directives
Sensitive Receptor	A component of the receiving environment which will experience an impact from the Proposed Project in some capacity
Wind Farm Control System	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.

GLOSSARY OF ACRONYMS

Acronym	Definition

CAHA	Climate and Health Alliance
CEBR	Centre for Economics and Business Research
CERIS	Centre for Economic Research on Inclusivity and Sustainable
CNAL	Construction Noise Assessment Locations
CSCS	Construction Skills Certification Scheme
CSO	Central Statistics Office
ED	Electoral Division
EHS	Environmental Health Service
ELF	Extremely Low Frequency
EMF	Electric Magnetic Fields
GDG	Guideline Development Group
HIA	Health Impact Assessment
HGV	Heavy Goods Vehicle
HSE	Health Service Executive
IAA	Irish Aviation Authority
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IEA	International Energy Agency
IEC	International Electrotechnical Commission
ISEP	Institute of Sustainability and Environmental Professionals
IWEA	Irish Wind Energy Association
LBNL	Lawrence Berkley National Laboratory
LGV	Light Goods Vehicle
NIMBY	Not In My Back Yard
NSL	Noise Sensitive Location
OHL	Overhead Line
OSI	Ordnance Survey Ireland
PSCS	Project Supervisor Construction Stage
PSDP	Project Supervisor Design Process
RESS	Renewable Energy Support Scheme
SCADA	Supervisory Control and Data Acquisition
WHO	World Health Organisation

5. POPULATION AND HUMAN HEALTH

5.1 Introduction

This section of the Environmental Impact Assessment Report (EIAR) identifies, describes and assesses the potential significant, direct and indirect effects of the Crumhach Wind Farm 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 of this EIAR.

As detailed in Section 1.1.1 in Chapter 1: Introduction, for the purposes of this EIAR, the various project components are described and assessed using the following references: 'Proposed Project', 'the Site', 'Proposed Wind Farm', 'Proposed Turbines', 'Proposed Grid Connection Route', 'Existing Wind Farm' and 'Existing Grid Connection'. Please see Section 1.1.1 of this EIAR for further details. A detailed description of the Proposed Project is provided in Chapter 4 of this EIAR.

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 section of the EIAR has been prepared by Edel Mulholland and Brandon Taylor and reviewed by Ellen Costello and Sean Creedon, all of MKO.

Brandon Taylor is a Project 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.

Edel Mulholand is an Environmental Scientist with MKO with over 1 year experience. Edel holds BA (Hons) in Environmental Science from the University of Galway. Prior to taking up her position with MKO in September 2024, Edel worked as an Environmental Chemistry Analyst with Complete Laboratory Solutions, Co. Galway, where she assisted with water quality analysis. Since joining MKO, Edel has assisted in the submission of several renewable energy developments. Edel's key strengths and areas of expertise are in environmental policy, drafting EIAR chapters, field work and QGIS mapping.

Ellen Costello is a Senior Environmental Scientist with MKO with over 6 years' experience in private consultancy. Ellen holds a BSc (Hons) in Earth Science, and a MSc (Hons) in Climate Change: Integrated Environmental and Social Science Aspects where she focused her studies on renewable energy development in Europe and its implications on environment and society. Ellen's key strengths and expertise are Environmental Protection and Management, Environmental Impact Statements, Project Management, and GIS Mapping and Modelling. Since joining MKO, Ellen has been involved in a range of renewable energy infrastructure projects. In her role as a senior project manager, Ellen 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.

This report has been reviewed by Sean Creedon (B.Sc., M.Sc.). Sean has 23 years' experience in planning and environmental impact elements within all stages of wind farm project delivery.

5.1.2 Relevant Guidelines and Data Sources

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

- Department of Health – Health in Ireland: Key Trends 2025;
- Environmental Impact Assessment of National Road Schemes- A practical Guide, National Roads Authority/ Transport Infrastructure Ireland, Revision 1, November 2008;
- Fáilte Ireland (2023) EIAR Guidelines for the Consideration of Tourism and Tourism Related Projects, July 2023
- Health Impact Assessment Resource and Tool Compilation, United States Environmental Protection Agency 2016;
- Health Impact Assessment Guidance, Institute of Public Health Ireland. 2021;
- Framework for Human Health Risk Assessment to Inform Decision Making developed by the United States Environmental Protection Agency (US EPA) 2014;
- Institute for Environmental Management and Assessment (2017) Health In Environmental Impact Assessment: A Primer for a Proportionate Assessment;
- Institute for Environmental Management and Assessment (2022) Determining Significance for Human Health in Environmental Impact Assessment;
- Central Statistics Office (CSO): Census of Ireland 2010, Census of Ireland 2016; Census of Ireland 2022; Census of Agriculture 2020;
- Sligo County Development Plan 2024-2030;
- The World Health Organisation (WHO) Environmental Noise Guidelines for the European Region (WHO, 2022 Update) https://www.who.int/
- Best Practice Guidelines for the Irish Wind Energy Industry, IWEA, 2012.
- British Horse Society's *'Advice on Wind Turbines and Equestrian Access'* (2025).

5.1.3 Scoping and Consultation

Section 2.7 of Chapter 2: Background to the Proposed Project of this EIAR describes the scoping and consultation exercise undertaken for the Proposed Project. Scoping was conducted in September 2024. Relevant to this chapter, responses were received from the Health Service Executive (HSE), Uisce Éireann & Fáilte Ireland. As part of an early-stage feasibility for the Proposed Project, telecommunications operators and aviation authorities were contacted by MKO in January 2021 in order to determine the presence of telecommunications links either traversing or in close proximity to the Existing Wind Farm. Furthermore, telecommunications operators and aviation authorities were contacted in May 2024 including Irish Rail 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 10th October 2024. Of relevance to this chapter were requests relating to shadow flicker, air quality and drinking water.

The scoping response from the HSE requested that a shadow flicker assessment, including all proposed mitigation measures, be undertaken to identify any sensitive receptors that may be impacted by shadow flicker. The HSE recommends that the turbines to be constructed on site utilise the most advanced available technology that permits shut down during times when residents are exposed to shadow flicker. Impacts from shadow flicker are assessed in Section 5.9, Section 5.10.2.2.7 and Section 5.10.3.2.7.

The HSE also included recommendations relating to air quality in their response, because airborne dust generated by the proposed construction works has the potential to have significant impacts on sensitive receptors. An assessment of the effects on human health as a result of impacts to air quality is presented in Section 5.10.2.2.3 and 5.10.3.2.3, and in more detail within Chapter 10: Air Quality.

In relation to noise and vibration, the scoping response recommends that all Noise Sensitive Locations (NSL) should be clearly identified, with baseline noise monitoring and an assessment of predicted construction and operational noise impacts. An assessment of the effects on human health as a result of noise and vibration impacts is presented in Sections 5.10.2.2.2 and 5.10.3.2.2, and in more detail in Chapter 12: Noise and Vibration.

The HSE requested that all nearby drinking water sources and private wells be identified, with potential impacts assessed and mitigation measures outlined. An assessment of the effects on human health as a result of impacts to water quality is presented in Sections 5.10.2.2.4 and 5.10.3.2.4, and in more detail in Chapter 9: Hydrology and Hydrogeology.

The HSE recommended that public consultation be conducted to ensure that all potentially significant impacts of the Proposed Project are addressed. It also suggested that a dedicated website be developed by the Applicant. The Applicant created a website, which has been and will be maintained throughout the EIA process (Crumhach | SSE Renewables). A public consultation event was also held on the 23rd and 24th of July 2025. Full details of the public consultation are available in Section 2.8 of Chapter 2: Background of the Proposed Project.

Uisce Éireann

Uisce Éireann provided a response to a scoping request on the 12th November 2024, and identified that the Proposed Project is located approximately 600 m south of an abstraction point operated by Uisce Éireann, which serves the Lough Esky regional water supply. Uisce Éireann advised that the Proposed Project should avoid any interaction with, or adverse impacts on, this water body and its associated catchment. It was also noted that the Proposed Grid Connection Route to the Srananagh 220kV substation may interact with Uisce Éireann infrastructure located within public roads.

On the 14th of April 2026, a data request for any water services within the Site was issued to Uisce Éireann. A response was received on the 15th of April 2026 which outlined existing water services within proximity of the Site and that there was limited information about the waste network within the Site but that it did not necessarily mean that there is no waste network present.

Uisce Éireann advised that in advance of any planning application submission, the Applicant is required to submit a diversion enquiry to Uisce Éireann and obtain a Confirmation of Feasibility (COF) letter from the Diversions Department. A list of recommendations and requirements to be considered in the scope of the EIAR was also provided. Interactions of the Proposed Project with Uisce Éireann's infrastructure is assessed in detail in Section 15.3.3.1.3 of Chapter 15 Material Assets of his EIAR.

Fáilte Ireland

A scoping response was received from Fáilte Ireland on the 19th of September 2024 and provided the '*Fáilte Ireland's Guidelines for the Treatment of Tourism in an EIA 2023*', to inform the preparation of the EIAR for the Proposed Project. The report provides guidance for those conducting EIA and compiling an EIAR, or those assessing EIARs, where the project involves tourism or may have an impact upon tourism (refer to Section 13.7.3.2.4 of Chapter 13: Landscape & Visual, Section 14.1.5.3 of Chapter 14: Cultural Heritage, Section 5.4, Section 5.10.2.1.5, and Section 5.10.3.1.5 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, the Sligo County Development Plan 2024 – 2030 and any other literature pertinent to the area was also considered in this assessment. See Section 5.3 below.

In order to assess the population in the vicinity of the Proposed Wind Farm, the Population Study Area for this population assessment focuses on the EDs within which the Proposed Wind Farm is within and adjacent to, namely Dromore and Templeboy South/ Mullagheruse, but it also refers to county and national statistics.

In order to assess the population in the vicinity of the Proposed Grid Connection Route, a review of properties and planning applications in the vicinity of the Proposed Grid Connection Route was carried out (properties within c.250m of the Proposed Grid Connection Route included).

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]

The assessment methodology and relevant national and international guidance will be discussed under the headings below.

The study area to examine Human Health is the same as that utilised for population assessments (i.e., the Population Study Area).

5.2.2.1 National Guidance

The '*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*' (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, Soils and Geology, Chapter 9: Hydrology and Hydrogeology, Chapter 10: Air Quality, Chapter 11: Climate, Chapter 12: Noise and Vibration, Chapter 13: Landscape and Visual, Chapter 14: Cultural Heritage, 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 that:

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

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

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

5.2.2.2 ISEP Guidance

5.2.2.3 Health in EIA: A Primer for a Proportionate Assessment, 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.

5.2.2.3.1 Determining Significance for Human Health in EIA, 2022

The IEMA Working Group 2022 published '*Determining Significance For Human Health In Environmental Impact Assessment'*[1] 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 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

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

several factors which are listed in the UK's *Update of UK Shadow Flicker Evidence Base* [2] report, each of which is outlined below.

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

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

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

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

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

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

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

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

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

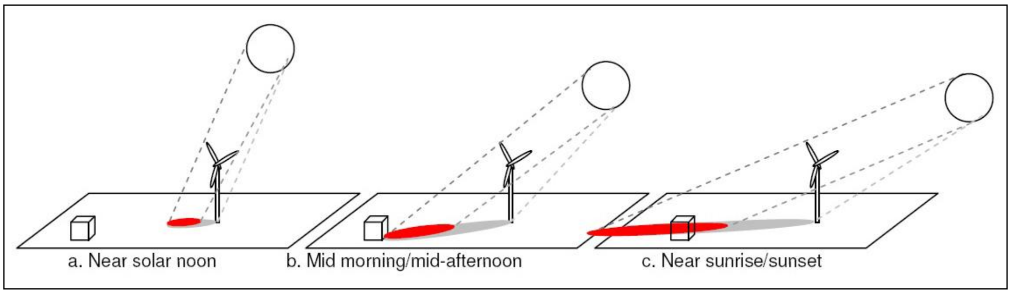


Figure 5-1 Shadow-Prone Area as Function of Time of Day (Source: Shadow Flicker Report, Helimax Energy, Dec 2008)

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

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

[3] *Met Éireann, www.met.ie*

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, topography 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. [4]

5. *Property usage and occupancy:*

Where shadow flicker is predicted to occur at a specific location, this does not imply that it will be witnessed. Potential occupants of a property may be sleeping or occupying a room on another side of the property that is not subject to shadow flicker or completely absent from the location during the time of shadow flicker events. As shadow flicker usually occurs only when the sun is at a low angle in the sky, i.e. very early in the morning after sunrise or late in the evening before sunset, even if there is a bedroom on the side of the property affected, the shadow flicker may not be witnessed if curtains or blinds in the bedroom are closed. It should be noted that the below assessment considers a theoretical precautionary worst-case assessment as detailed in Section 5.9.1 below.

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

The direction of wind turbine blades changes according to wind direction, as the turbine rotor turns to face the wind. In order to cast a shadow, the turbine blades must move across the path of the light source relative to the observer. This can occur at a range of rotor orientations and is not limited to situations where the turbine is facing directly toward or away from the sun. This is demonstrated in Figure 5-2 below.

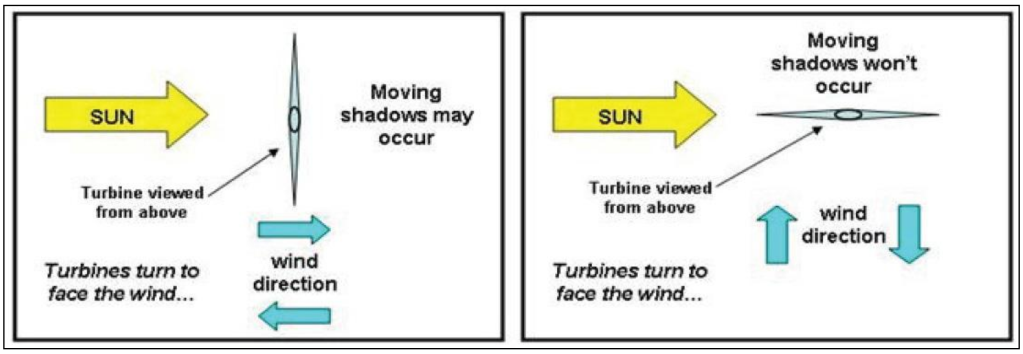


Figure 5-2 Turbine Blade Position and Shadow Flicker Impact (Source: Wind Fact Sheet: Shadow Flicker, Noise Environment Power LLC)

7. *Rotation of turbine blades:*

Shadow flicker occurs only if there is sufficient wind for the turbine blades to be 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.

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

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 study area adopted for the shadow flicker assessment is 10 rotor diameters of the Proposed Turbine locations (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 location should not exceed a total of 30 hours per year or 30 minutes per day.

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

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

Although the Guidelines (DoEHLG, 2006) threshold applies to properties located within 500 metres of a proposed turbine location, for the purposes of this assessment, the thresholds of 30 hours per year or 30 minutes per day have been applied to all properties located within the Shadow Flicker Study Area i.e. 10 rotor diameters of the Proposed Turbines (1.5km in this case) of the Proposed Turbines (as per '*Best Practice Guidelines for the Irish Wind Energy Industry*', IWEA, 2012).

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

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

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

In the Annex of Actions[6] for Climate Action Plan 2025 (CAP25), published in April 2025, Action EL/24/5 stated that revised wind energy development guidelines for onshore wind would 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

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

[6] *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*

noted the Proposed Turbines could be brought in line with the requirements of the Draft Guidelines (DoHPLG, 2019) through the stricter implementation of the mitigation measures outlined in Section 5.10.3.2.7.

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 follows a predictable path through the sky.

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 4.2.285 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.

5.2.3.4 Shadow Flicker Assessment Criteria

The Proposed Turbines to be installed on the Proposed Wind Farm will have a ground-to-blade tip height, hub height and rotor diameter of the following, limited, ranges:

- Turbine Tip Height – 176.6m to 180m
- Hub Height – 105m to 110m
- Rotor Diameter – 133.2m to 150m

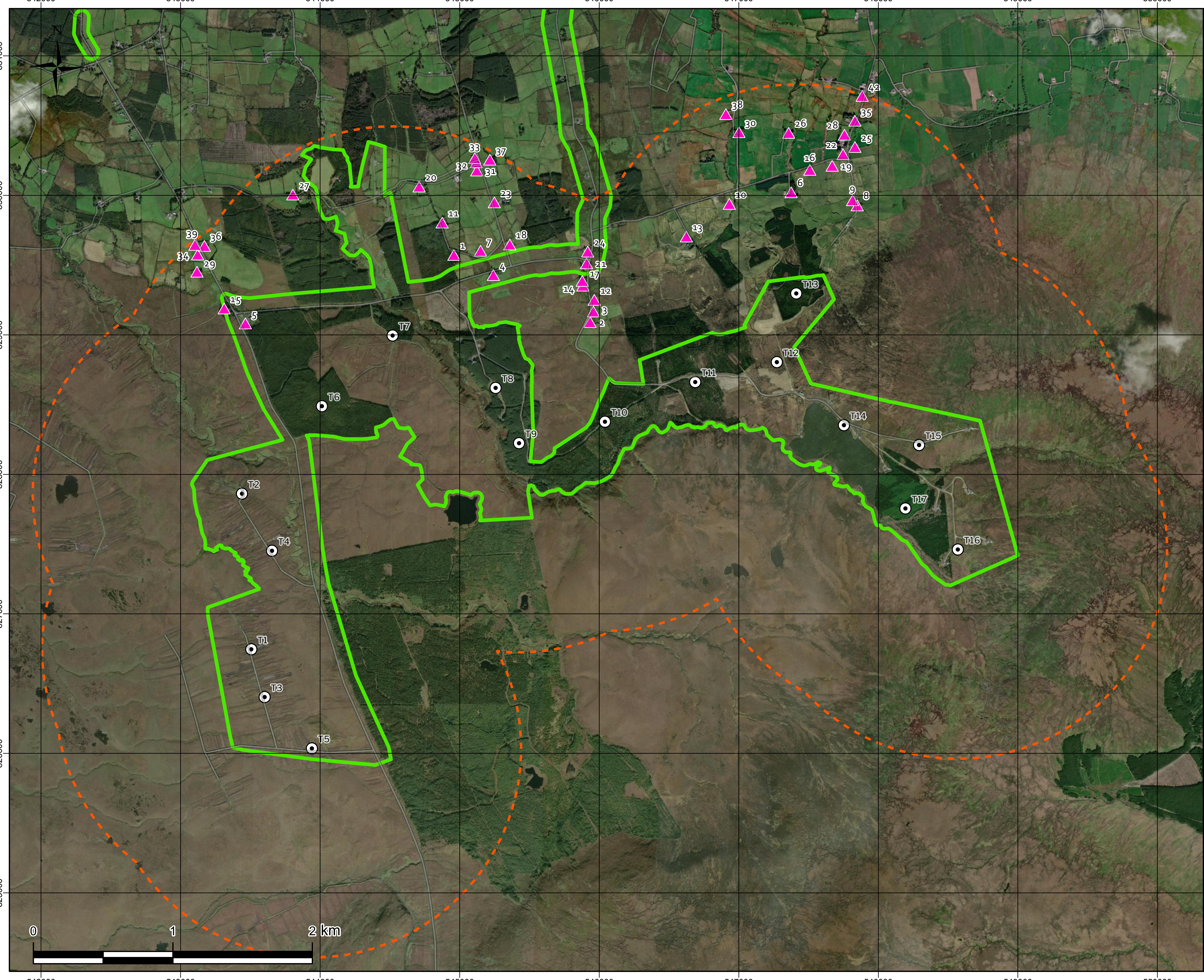
Planning permission is being sought for a turbine with a tip height of 176.6m to a tip height of 180m. The potential shadow flicker impacts arising from the Proposed Turbines will be no greater than those predicted in this assessment, which are based on the maximum proposed rotor diameter of 150m. A comparative shadow flicker assessment is detailed in Section 5.9.1.1 below and presents the modelling results for a Scenario 2, and 3. With the benefit of the mitigation measures outlined in Section 5.10.3.2.7, any turbine to be installed onsite would be able to comply with the Guidelines (DoEHLG, 2006) thresholds of 30 minutes per day or 30 hours per year, and if necessary, with the Draft Guidelines (DoHPLG, 2019) through the use of mitigation measures via turbine control software. Any references to the turbine dimensions in this shadow flicker assessment should be considered in the context of the above and should not be construed as pre-determining the dimensions of the wind turbine to be used on the Site.

5.2.3.5 Shadow Flicker Study Area

At the outset of the Proposed Project, during the constraints mapping process detailed in Section 3.2.3.2.1 of 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 properties. In addition, a planning history search to identify properties that may have been granted planning permission, but not yet constructed, was carried out. Any property with a valid planning permission/application 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 maximum rotor diameter x 10 = 1.5km). The Guidelines (DoEHLG, 2006) note that, at distances greater than 10 times the rotor diameter of a proposed turbine, the potential for shadow flicker is very low, and therefore the Shadow Flicker Study Area is set at 1.5km from the Proposed Turbines. All inhabitable dwellings within 1.5km of the Proposed Turbines have been considered as part of the following shadow flicker assessment. There are 40 no. properties identified within 1.5km of the Proposed Turbines of which 5 no. are derelict properties. There are 13 inhabitable dwellings located within 1 kilometre of the Proposed Turbine locations. A total of 37 no. properties are theoretically predicted to experience some shadow flicker effects. It should be noted that of these 37 no. properties, 21 no. properties are predicted to experience effects in excess of the 30-minute shadow flicker threshold. Of these 21 no. properties, 4 no properties are in derelict conditions.

The Shadow Flicker Study Area and sensitive receptor locations are shown in Figure 5-3, with all properties detailed in Table 5-10 in Section 5.9.1 below.



Drawing Title
Shadow Flicker Study Area

Project Title
Crumhach Wind Farm, Co. Sligo

Project No.	Drawing No.	Scale
230841	5-3	1:25,000
Drawn By	**Checked By**	**Date**
MVN	BT	06/08/2026

MKO

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

5.2.4 Assumptions and Limitations

5.2.4.1 Population

Population has been assessed in this EIAR using the most recent data available, guidance and best practice referenced above. No assumptions 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

Due to the latitude of Ireland shadow flicker impacts are only possible at properties approximately 130 degrees either side of north (i.e., a shadow flicker event can occur within an approximately 260-degree span), as turbines do not cast shadows on their southern side[7]. As such, properties located outside of this potential shadow flicker zone (approximately 50 degrees either side of south) will not be impacted. However, in taking a precautionary approach for this assessment, all 40 no. properties within 360 degrees of the Proposed Turbine locations out to 1.5km were assessed for shadow flicker impact.

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 5.10.3.2.7.

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

- The sun is assumed to be shining during all daylight hours such that a noticeable shadow is cast. This will not occur in reality.
- The wind is always assumed to be within the operating range of the turbines such that the turbine rotor is turning at all times, thus enabling a periodic shadow flicker. Wind turbines only begin operating at a specific 'cut-in speed', and cease operating at a specific 'cut-out speed'. In periods where the wind is blowing at medium to high speeds, the probability of there being clear or partially clear skies where the sun is shining and could cast a shadow, is low.

---

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

- The wind turbines are assumed to be available to operate, i.e. turned on at all times. In reality, turbines may be switched off during maintenance or for other technical or environmental reasons.
- The turbine rotor is considered (as a sphere) to present its maximum aspect to observers in all directions. In reality, the wind direction and relative position of the turbine rotor would result in a changing aspect being presented by the turbine. The rotor will actually present as ellipses of varying sizes to observers from different directions. The time taken for the sun to pass across the sky behind a highly elliptical rotor aspect will be shorter than the modelled maximum aspect.

The total annual shadow flicker calculated for each property assumes 100% sunshine during daytime hours, as referred to above. However, weather data for this region shows that the sun shines on average for 24.4% of the daylight hours per year. This percentage is based on Met Éireann data recorded at Bellmullet weather station over the 30-year period from 1981-2010 (www.met.ie). The Met Éireann weather station at Bellmullet, Co. Mayo, which is located approximately 73 km to the west of the Site, is the nearest weather and climate monitoring station to the Proposed Wind Farm that has meteorological data recorded for the 30-year period from 1981-2010. The actual sunshine hours at the Proposed Wind Farm and therefore the percentage of time shadow flicker could actually occur is 24.4% of daylight hours. Where the annual shadow flicker is calculated for each property, it is corrected for the regional average of 24.4% sunshine, to give an accurate annual average shadow flicker prediction. Table 5-10 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 Sligo County Development Plan 2024-2030 and Fáilte Ireland. The study included an examination of the population and employment characteristics of the area. This information was sourced from the Census of Ireland 2022, which is the most recent census for which a complete dataset is available. Data was also obtained from 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 Proposed Wind Farm is located on the northwest slopes of the Ox Mountains, located approx. 4.5km south of the village of Dromore West, and approx. 3km southwest of the village of Templeboy in Co. Sligo, at their nearest points. Please refer to Figure 1-2 of Chapter 1 for the site location context. The Site measures approximately 1,546 hectares. The Proposed Wind Farm is accessed via the L6309 and L2702 Local Roads off the N59 National Road, travelling in an east-west direction north of the site and the N17 National Road, which runs in a north-south direction to the southeast of the site. The current entrance to the Existing Wind Farm is proposed as the main site entrance, utilising the existing access tracks and infrastructure. Upgrades to additional existing site entrances along the L6309 and L2702 Local Roads and the provision of a new site entrance on the L2702 are proposed to access the adjoining lands. The Proposed Wind Farm falls within the townlands listed in Table 1-1 of Chapter 1. All townlands are located in Co. Sligo.

In order to assess the population in the vicinity of the Proposed Wind Farm, the 'Population Study Area' for the population section of this EIAR was defined in terms of EDs. 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. The Proposed Wind Farm lies within two (2) No. EDs: Dromore and Templeboy South/ Mullagheruse, 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 840 persons as of 2022, with the populations of each electoral division as follows:

- Dromore (576 persons)
- Templeboy South/ Mullagheruse (264 persons)

The total land area of the Population Study Area totals 95km^2 and comprises Dromore 12km^2 and Templeboy South/ Mullagheruse 83km^2.

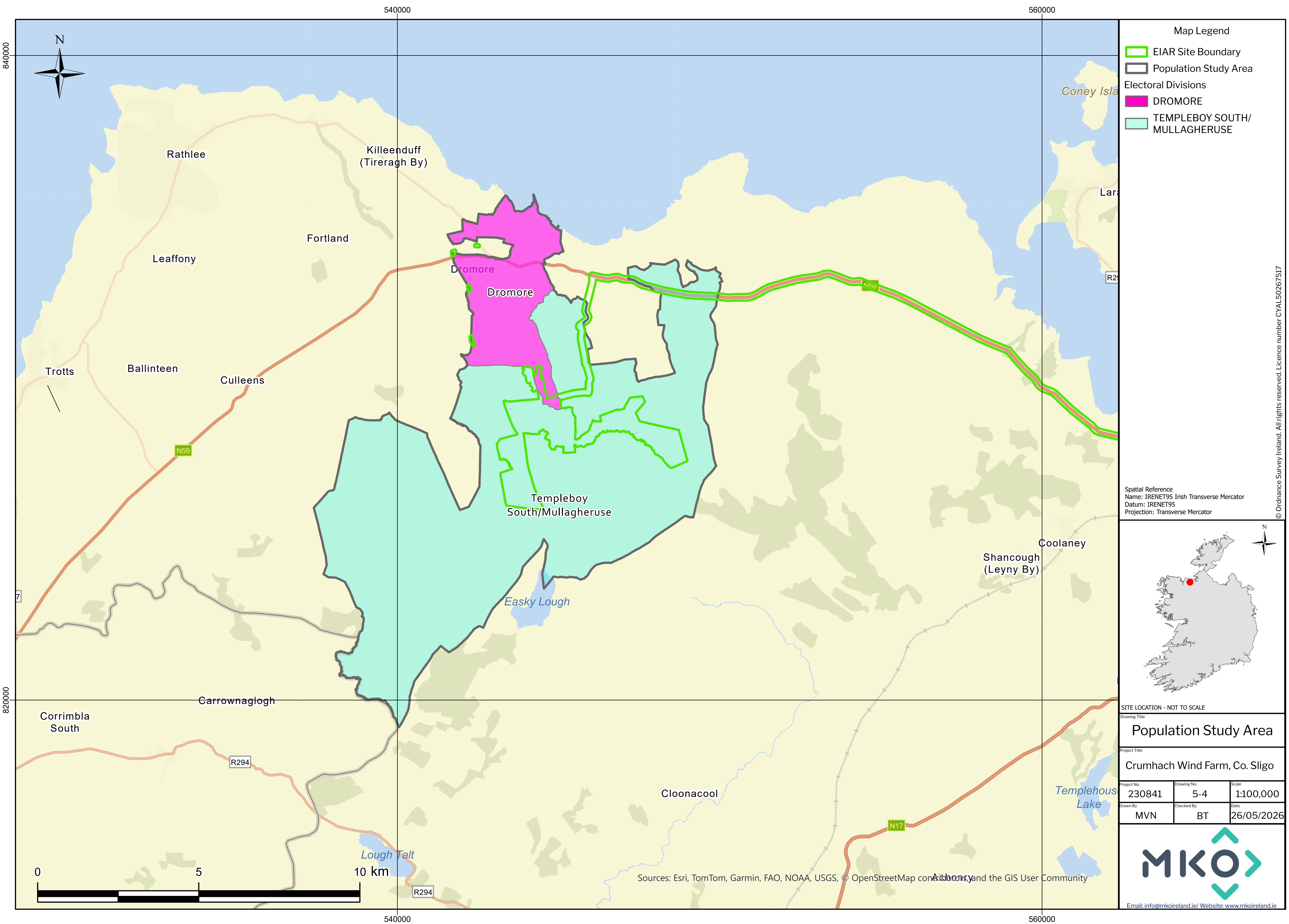
There are 18 no. properties located within 1km of the Proposed Turbines, of which 4 no. are derelict properties and 1 no. is a water treatment plant. The closest property is located approximately 728m from the nearest proposed turbine (T10), i.e., greater than both the minimum recommended setback for properties involved in the project (500 m) and the recommended 4x tip height setback (720m) from properties not involved in the Proposed Project (as recommended in the Draft DoEHLG 2019 Guidelines). Figure 5-5 shows the population study area of the Proposed Grid Connection Route.

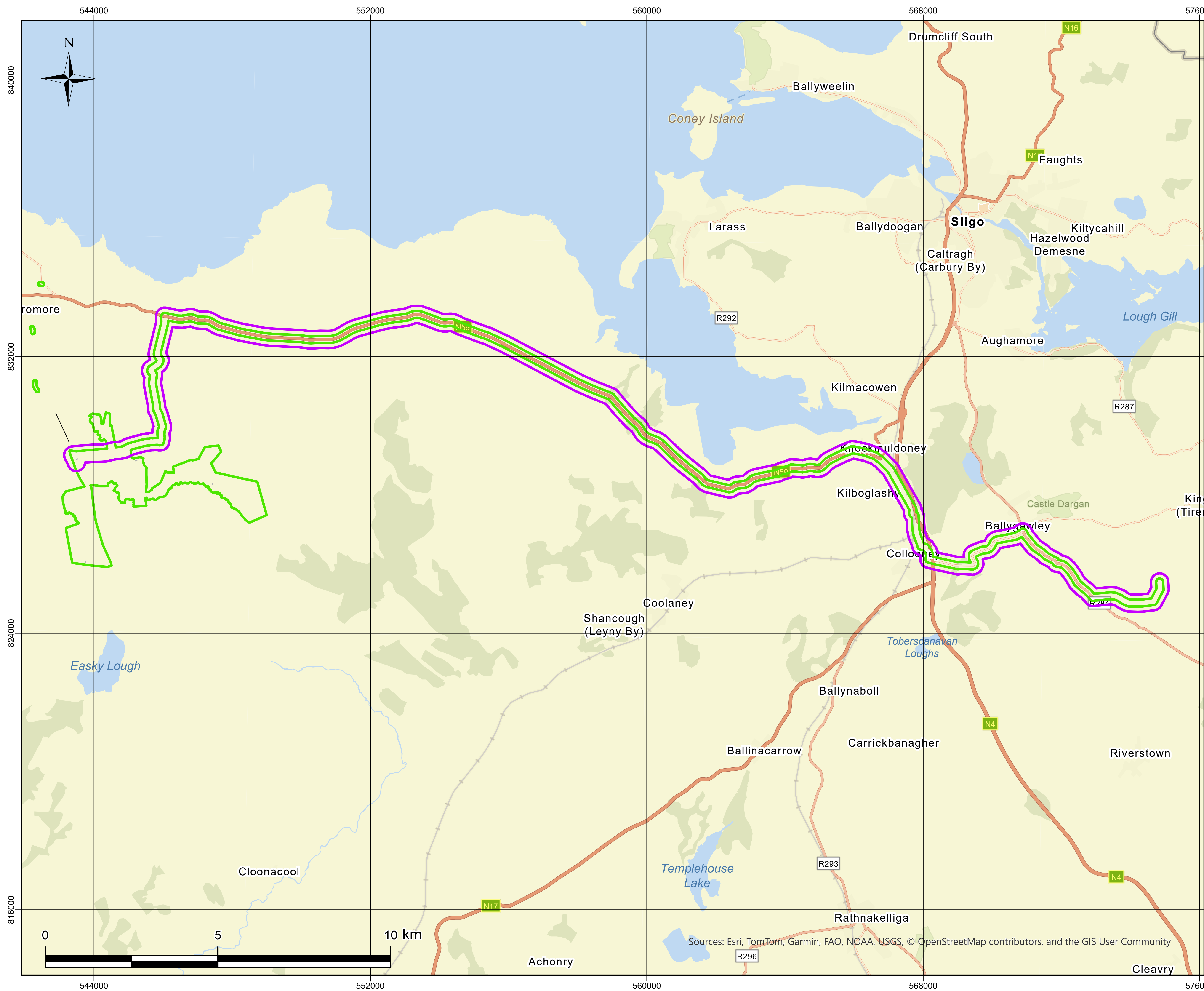
The Institute of Air Quality Management '*Guidance on the assessment of dust from demolition and construction*'[8] identifies that dust emissions may be deposited up to 250m from proposed works. Therefore, under a precautionary approach, a 250m buffer has been applied to the Proposed Grid Connection Route to assess any potential effects on human health; please see Section 10.3.2.2 of Chapter 10: Air Quality for the detailed dust assessment. There are 1,379 no. properties located within 250m of the Proposed Grid Connection Route.

The active construction area for the Proposed Grid Connection Route will be small, ranging from 100 to 200 metres in length at any one time, and it will be transient in nature as it moves along the route. Should separate crews be used during the construction phase they will generally be separated by one to two kilometres.

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

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


540000
560000
840000
820000
N
Rathlee
Killeenduff (Tireragh By)
Fortland
Leaffony
Dromore
Dromore
Trotts
Ballinteen
Culleens
N59
Templeboy South/Mullagheruse
Easky Lough
Coney Isla
Lara
Coolaney
Shancough (Leyny By)
Carrownaglogh
Corrimbla South
R294
Cloonacool
Templehouse Lake
N17
Lough Talt
Aclare
0
5
10 km
Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community
Map Legend
EIAR Site Boundary
Population Study Area
Electoral Divisions
DROMORE
TEMPLEBOY SOUTH/ MULLAGHERUSE
Spatial Reference
Name: IRENET95 Irish Transverse Mercator
Datum: IRENET95
Projection: Transverse Mercator
© Ordnance Survey Ireland. All rights reserved. Licence number CYAL50267517
SITE LOCATION - NOT TO SCALE
Drawing Title
Population Study Area
Project Title
Crumhach Wind Farm, Co. Sligo
Project No.
230841
Drawing No.
5-4
Scale
1:100,000
Drawn By
MVN
Checked By
BT
Date
26/05/2026
Email: info@mkoireland.ie/ Website: www.mkoireland.ie



Map Legend

- EIAR Site Boundary
- 250m Proposed Grid Connection Route Population Study Area

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

SITE LOCATION - NOT TO SCALE

Drawing Title
Proposed Grid Connection Route Population Study Area

Project Title
Crumhach Wind Farm, Co. Sligo

Project No.	Drawing No.	Scale
230841	5-5	1:100,000
Drawn By	**Checked By**	**Date**
MVN	BT	26/05/2026

MKO

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

5.3.2 Population Trends

The recently published Census of 2022 shows that the population of County Sligo grew by 7.1% to 70,198 since the 2016 Census. Over the same period, Ireland's population grew by 8.1% from 4,761,865 to 5,149,139. Population statistics for the State, County Sligo 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 Sligo	65,535	70,198	+7.12%
Population Study Area	680	840	+23.53%

The data presented in Table 5-1 shows that the population of the Population Study Area increased by 23.5% between 2016 and 2022. This rate of population growth is the considerably higher than that recorded at State level and County level. When the population data is examined in closer detail, it shows that the rate of population increase within the Population Study Area was similar for the 2 no. Electoral Divisions (EDs); Dromore at 22.8%, and Templeboy South/ Mullagheruse at 25.1%. Of the 2 no. EDs that make up the Population Study Area for this assessment, the highest population was recorded in Dromore ED, with 576 persons recorded during the 2022 Census. The lowest population was recorded in Templeboy South/ Mullagheruse ED, with 264 persons recorded during the 2022 Census. This low population is due to the land cover predominantly comprising of peatlands and agricultural land.

5.3.3 Population Density

The population densities recorded within the State, County Sligo 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	67.76	73.27
County Sligo	35.66	38.19
Population Study Area	7.16	8.84

The population density of the Population Study Area recorded during the 2022 Census is 8.8 persons per km^2 which is considerably lower than the national population densities of 73.3 persons per km^2 and lower than the population density of County Sligo, recorded at 38.2 persons per km,^{2} respectively. Dromore ED had the highest population density at 4.8 persons per km^2, while Templeboy South/ Mullagheruse ED recorded the lowest population density at just 3.2 persons per km^2.

5.3.4 Household Statistics

The number of households and average household size recorded within the State, County Sligo 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 Sligo	24,831	2.56	26,855	2.54
Population Study Area	266	2.65	298	2.64

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 largely the same due to the proportionate increase in population during this period. Average household size recorded within the Population Study Area during the 2016 and 2022 Censuses is slightly above and less than that observed at County and State level during the same time period, respectively. The average household size recorded in the Population Study Area is consistent between both EDs. Dromore ED recorded 2.6 persons per household recorded in 2022. Templeboy South/ Mullagheruse ED recorded the highest with 2.8 persons per household in 2022.

5.3.5 Age Structure

Table 5-4 presents the population percentages of the State, County Sligo 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 5-6.

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 Sligo	19.1%	12.3%	24.0%	26.2%	18.4%
Population Study Area	21%	11%	22%	27%	19%

The proportion of the Population Study Area population is broadly similar to those recorded at national and county level for most categories. For the Population Study Area, the highest population percentage occurs within the 45-64 age category (Figure 5-6). This age category would be considered to be less sensitive to change when compared to other age categories with higher home ownership and lower geographic mobility. The lowest population percentage within the Population Study Area occurs within the 15-24 range age category, at 11%. This is lower than County population percentage. This age category being considered one of the more sensitive age categories to change, with over one third of emigrants in 2024 falling within this age category[9]. The age category results of the Population Study Area correspond with the trend of younger generations leaving rural areas to move to urban areas with greater education and employment opportunities.

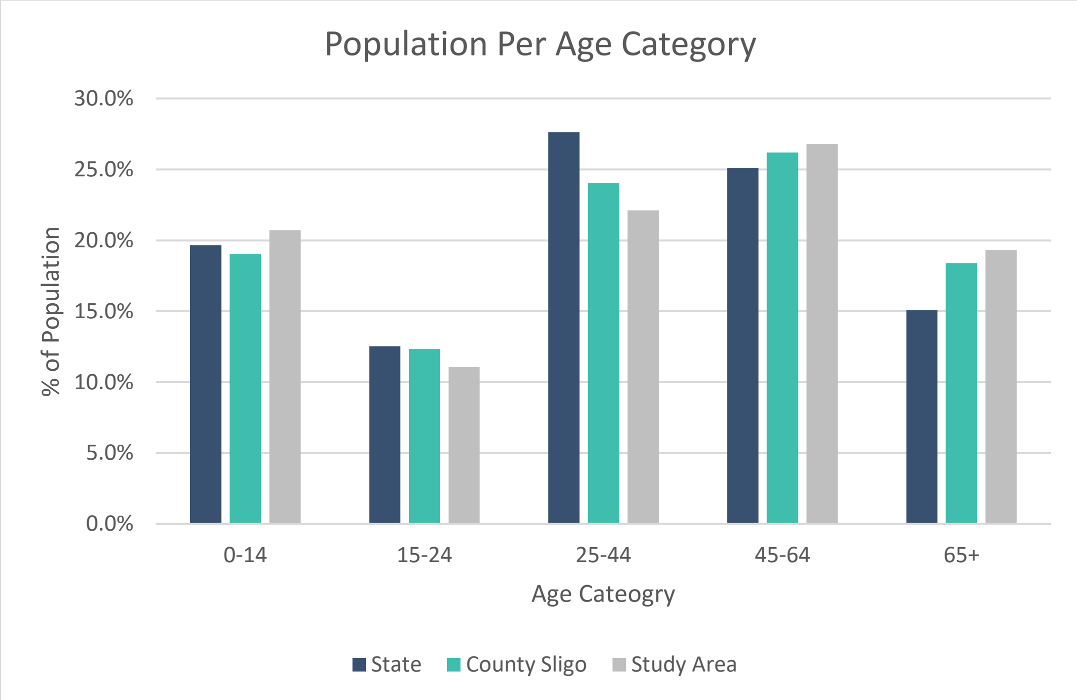


Figure 5-6 Population per Age Category in 2022 (Source: CSO)

5.3.6 Employment and Economic Activity

5.3.6.1 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 30,360 people (aged 15 and over) at work in Co. Sligo, an increase of 4,358 people (+16.8%) between 2016 and 2022. Nationally, there were 313,656 additional people (+16%) at work. This figure is further broken down into the percentages that were at work, seeking first time employment or unemployed. It also shows the percentage of the total population aged 15+ who were not in the labour force, i.e., those who were students, retired, unable to work or performing home duties. Table 5-5 shows the percentage of the total population aged 15+ who were in the labour force during the 2022 Census.

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

Status		State	County Sligo	Population Study Area
% of population aged 15+ who are in the labour force		**61%**	**58%**	**58%**
% of which are:	At work	92%	92%	91%
	Looking	1%	1%	0%
	Unemployed	7%	7%	9%

[9] *CSO, 2024. Migration Classified by Age Group, 2024. Available at: https://data.cso.ie/table/PEA03*

Status		State	County Sligo	Population Study Area
% of population aged 15+ who are not in the labour force		**39%**	**42%**	**42%**
% of which are:	Student	29%	27%	26%
	Home duties	17%	12%	17%
	Retired	41%	48%	47%
	Unable to work	12%	12%	10%
	Other	2%	1%	1%

Overall, the principal economic status of those living in the Population Study Area is broadly similar to that recorded at State and County level. Of those who were not in the labour force during the 2022 Census, the highest percentage of the population in the Population Study Area was in the 'Retired' category, which is similar to the figures recorded at State and County level that show 'Retired' as the highest category.

5.3.6.2 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 5-7 shows the percentages of those employed in each socio-economic group in the State, County Sligo, and the Population Study Area during 2022.

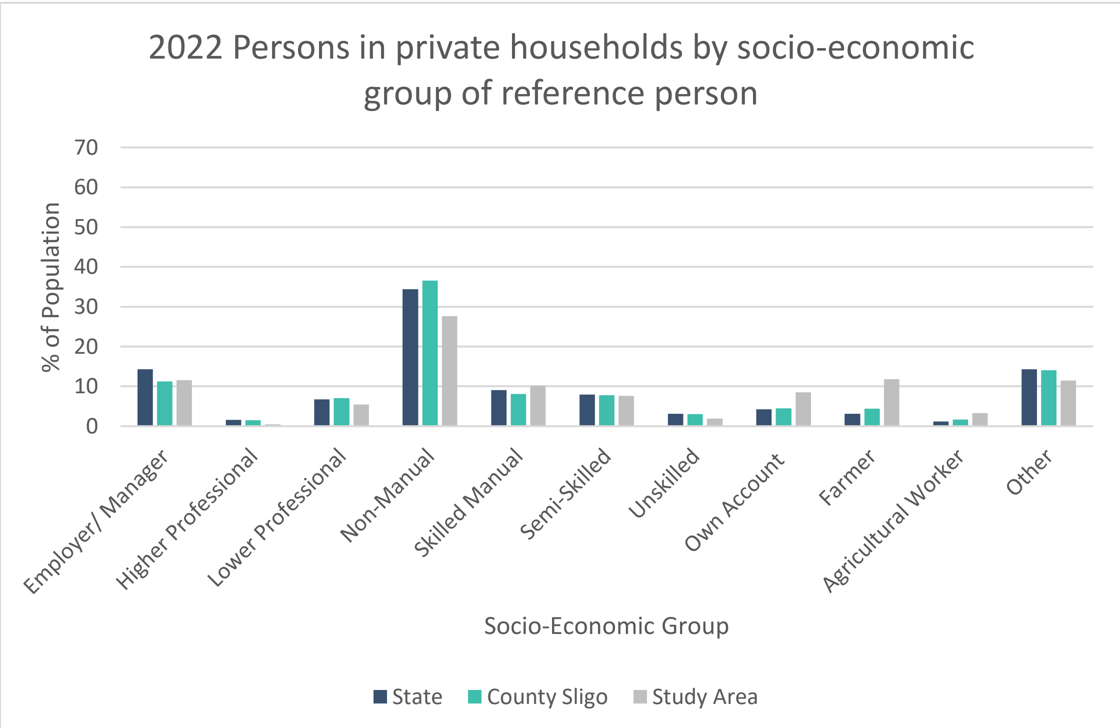


Figure 5-7 Persons in private households by socio-economic group in 2022 (Source: CSO).

The highest level of employment within the Population Study Area was recorded in the Non-Manual category. The levels of employment within the, Skilled Manual, Own Account, Farmer and Agricultural Worker categories in the Population Study Area were higher than those recorded for County Galway and the State, while those recorded within the Employer/ Manager, Lower Professional, Non-Manual, Higher Professional, Semi-Skilled, Un-skilled and Other categories were lower than those recorded for County Galway and State levels.

5.3.6.3 Employment and Investment Potential in the Irish Wind Energy Industry

5.3.6.3.1 *Background*

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

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

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

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

The Sustainable Energy Authority of Ireland (SEAI)[12] demonstrates in their '*Wind Energy Roadmap 2011-2050'* report, 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."*

---

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

[11] *Siemens and 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/system/files/publications/BKMNEXT250%20%281%29.pdf*

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

5.3.6.3.2 Energy Targets

The Climate Action Plan 2025[13] (CAP 2025) was launched in April 2025. Following on from Climate Action Plans 2019, 2021, 2023, and 2024, CAP 2025 sets out the roadmap to deliver on Ireland's climate ambition. It aligns with the legally binding economy-wide carbon budgets and sectoral ceilings that were agreed by Government in July 2022 following the Climate Action and Low Carbon Development (Amendment) Act 2021, which commits Ireland to a *legally binding target of net-zero greenhouse gas emissions no later than 2050, and a reduction of 51% by 2030*. CAP 2025 sets out indicative ranges of emissions reductions for each sector of the economy.

Further information on energy and climate change targets is detailed in Chapter 11: Climate of this EIAR, Chapter 1: Introduction (Section 1.5) and Chapter 2: Background to the Proposed Project (Section 2.2 and Section 2.3)

5.3.6.3.3 Employment Potential

According to a 2021 KPMG report on behalf of Wind Energy Ireland, "*Economic impact of onshore wind in Ireland*"[14], as of 2021, the onshore wind energy sector in Ireland supported 5,130 jobs in 2021 (excluding employment in grid development) through the sector and its supply chain. By 2030, under a scenario of 8,200 MW installed capacity, there is potential for 7,020 jobs. These figures update those estimated in a Siemens and IWEA (2014) report, which predicted that the wind energy sector in Ireland would produce 6,659 direct jobs in a scenario where 4GW capacity is achieved by 2020. It was estimated that 5,596 of these jobs would be associated directly with the construction and installation of windfarms, while the remaining 1,063 jobs would be associated with the national grid. Under this scenario, this translates to 1.66 direct jobs per megawatt (MW) of wind capacity throughout the various stages of installation. Ireland needs to achieve a total of 9GW of onshore wind by 2030 which will further support further employment. According to Wind Energy Ireland, the installed onshore wind capacity in Ireland has exceeded 5,000 MW as of January 2025[15], which would support employment during the last decade.

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

Internationally, a report issued by WindEurope in September 2017, entitled '*Wind energy in Europe: Scenarios for 2030'* [17] 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,*

[13] *Department of the Environment, Climate and Communications, 2025. Climate Action Plan 2025. Available at: https://assets.gov.ie/static/documents/Climate_Action_Plan_2025_updated_cover.pdf*
[14] *KPMG on behalf of Wind Energy Ireland. 2021. Economic impact of onshore wind in Ireland. Available at: https://windenergyireland.com/images/files/economic-impact-of-onshore-wind-in-ireland.pdf*
[15] *Wind Energy Ireland, 2025. Irish wind farms provide a third of our power in 2024 and set new energy milestone. https://windenergyireland.com/latest-news/7827-irish-wind-farms-provide-a-third-of-our-power-in-2024-and-set-new-energy-milestone*
[16] *Poyry The Value of Wind Energy to Ireland – March 2014*
[17] *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>*

298.5 GW onshore and 99 GW offshore. In this scenario, the wind energy industry would invest €351bn by 2030, and it would create 716,000 jobs'.

A new report published by MaREI, the SFI Research Centre for Energy, Climate and Marine, hosted by University College Cork[18] (March 2021) details that in order to meet the government target of net-zero carbon emissions by 2050, at least 25,000 jobs will be created in the development of onshore and offshore wind to meet our zero carbon targets.

A more recent report which was issued by WindEurope in February 2022, titled '*Wind Energy in Europe: 2021 Statistics and the Outlook for 2022-2026*'[19] details various scenarios in Europe in respect to the EU target for renewable energy. According to WindEurope's report, '*Europe installed 17GW (11 GW in the EU-27) of new wind capacity in 2021. This is not even half of what the EU should be building to be on track to deliver its 2030 Climate Energy Goals.*' The report continued on to state that '*We expect Europe to install 116 GW of new wind farms over the period from 2022-2026. Three quarters of these new capacity additions will be onshore wind.*' The report also states that '*The European Commission modelling shows that we need at least 79 GW offshore wind but National Government have pledged to build at least 92 GW offshore wind capacity by 2030.'*

As of January 2025, there were 6.3GW of wind energy capacity installed on the island of Ireland[20]. Of this, 4.9GW was installed in the Republic of Ireland. The majority of the Republic of Ireland's installed wind energy capacity is located in Counties Donegal, Galway, Cork, Clare and Kerry, contributing to employment potential on the Island of Ireland.

5.3.6.3.4 Economic Value

A 2019 report by Baringa, '*Wind for a Euro: Cost-benefit analysis of wind energy in Ireland 2000-2020*'[21], has analysed the financial impact for end consumers of the deployment of wind generation in Ireland over the period 2000-2020. The report calculates how the costs and benefits for consumers would have differed if no wind farms had been built. The analysis indicated that the deployment of 4.1GW of wind generation capacity in Ireland between 2000 and 2020 (2018-2020 results being projective) will result in a total net cost to consumers, over 20 years, of €0.1 billion (€63 million to be exact), which equates to a cost of less than €1 per person per year since 2000. Further cost benefit analysis noted that wind energy has delivered €2.3 billion in savings in the wholesale electricity market. As such, the economic benefit of renewable energy to consumers is greater than what would have been if Ireland did not invest in wind power. This corresponds with the Deloitte report which indicates that more wind energy feeding into the national grid will result in lower and more stable energy costs for consumers.

Furthermore, in May 2020, IWEA released its 70by30 Implementation Plan Reports[22] 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.

---

[18] https://www.marei.ie/our-climate-neutral-future-zeroby.50/
[19] 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/>
[20] Eirgrid, https://www.eirgrid.ie/grid/system-and-renewable-data-reports
[21] 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/>
22 https://windenergyireland.com/all-documents?file_category=21

5.3.7 Land-Use Patterns and Activities

The land uses within the Site are predominantly comprised of an existing renewable energy infrastructure (Existing Wind Farm and Existing Grid Connection), commercial forestry, peat/turf cutting, pastoral agriculture land, and low-density residential areas. The primary surrounding land use within the Population Study Area comprises a mix of pastoral agriculture, peatlands and low-density residential properties. The total area of farmland within the two EDs, around the Proposed Wind Farm, measures approximately 5,044 hectares (ha), comprising 75.7% of the Population Study Area, according to the CSO Census of Agriculture 2020. There are 102 farms located within the two EDs, with an average farm size of 48 ha.

Table 5-6 shows the breakdown of farmed lands within the two 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	Average farmed (hectares)
Dromore	48	25.7	62.5	1,262	1,231.2
Templeboy South/ Mullagheruse	54	70.6	56	1,683	3,812.4
Total	102	48.15 (average)	59.25 (average)	2,945	5,043.6 (average)
Size of 2 EDs			6,662 hectares		
Total Area Farmed within 2 EDs			5,044 hectares		
Farmland as % of EDs			**75.71%**		

5.3.8 Services

The Proposed Project is located approximately 4.5km south of the village of Dromore West and approximately 3km southwest of the village of Templeboy in Co. Sligo. The main services are located within the town of Ballysadare, which lies approximately 28km east of the Proposed Project. Additionally, the town of Ballina lies approximately 30km southwest of the Proposed Project and encompasses larger scale retail and services are available.

5.3.8.1 Education

The nearest primary school to the Proposed Wind Farm is St. Mary's National School, located approximately 5.8km northeast of the nearest Proposed Turbine (T13). Owenbeg School is located approximately 8.7 km northwest of the nearest Proposed Turbine (T06). The nearest secondary school is Coláiste Iascaigh which is located approximately 11.2km northwest of the nearest Proposed Turbine (T07).

The closest Third-Level Institution to the Site is IT Sligo which is located approximately 23km northeast of the nearest Proposed Turbine (T15).

With regards to the Proposed Grid Connection Route, the nearest primary school is St Johns National School located approximately 75m north of the Proposed Grid Connection Route at its closest point, in the townland of Ballysadare.

5.3.8.2 Access and Public Transport

The main site entrance for the Proposed Wind Farm is off the L6039 local road along the northern boundary of the Proposed Wind Farm, currently utilised for the Existing Wind Farm. The Proposed Wind Farm is also served by a number of existing tracks and access tracks. As part of the Proposed Wind Farm, it is proposed to utilise 3 no. existing access/egress locations along the L6309 and L2702 local roads and construct 1 no. new access/egress location along the L2702 local road for the proposed onsite 110kVsubstation.

There is no public transport access to the Proposed Wind Farm. The nearest public transport access (public train station) is in Collooney, located approximately 19.2km east of the nearest Proposed Turbine (T16).

With regards to the Proposed Grid Connection Route, the nearest public transport access (public train station) is also in Collooney, located approximately 900 metres north at its nearest point. Refer to Section 15.3.3.1.5 in Chapter 15 of the EIAR for further details,

From the townland of Templeboy, approximately 3.8km north the nearest Proposed Turbine (T13), there are Bus Eireann connections to Sligo Town, from which a significant number of destinations may be reached.

5.3.8.3 Amenities and Community Facilities

The Sligo Way Walking Route, which caters for walkers and cyclists is an 80km route which crosses Sligo from Lough Talt, in the Ox Mountains to Dromahair in County Leitrim.[23] 7.2km of the trail passes through the Proposed Wind Farm, 3.3km via the L2702 local road, 1.6km along the L6309 local road and 2.3km with the Existing Wind Farm and local access tracks. The Proposed Grid Connection Route passes under the Sligo Way for 2.3km along the L6309 local road. The majority of amenities and community facilities, including GAA and other sports clubs, youth clubs and recreational areas are located in the centres of settlement throughout the wider area. Retail and personal services within the vicinity are provided in the larger settlements in the wider area such as Ballysadare, Sligo Town, and Ballina.

St Farnan's GAA club is located approximately 3.8km north of the nearest Proposed Turbine (T13). St Patricks GAA Club is located approximately 15m south of the Proposed Grid Connection Route, at is nearest point.

The varied natural environment of this area of County Sligo provides opportunities for walking, cycling and horse riding, however, there are no designated walking trails within the Site. The nearest designated walking routes lie to the southeast, the Knocknashee Walk and the Sligo Camino in the village of Coolaney which are approximately 11.5km and 12.3km respectively.

Community Benefit proposals, which would provide the opportunity to enhance local amenities and community facilities are described in Section 4.9.3 of Chapter 4.

[23] https://www.sportireland.ie/outdoors/walking/trails/sligo-way

5.4 Tourism

For the purposes of this section, the Proposed Wind Farm is considered solely in relation to the tourism baseline assessment set out below in Section 5.4.1 – 5.4.3. Due to the temporary nature of the works and any potential effects associated with the Proposed Grid Connection Route, it has been scoped out from the tourism assessment that follows.

5.4.1 Tourism and Revenue

Tourism is one of the major contributors to the national economy and is a significant source of full time and seasonal employment. *Key Tourism Facts 2024*[24], pertaining to domestic and international tourism volumes for Ireland, was published by Failte Ireland in August 2025 for the year 2024. In 2024, out-of-state (Overseas and Northern Ireland) tourist expenditure amounted to €6.6 billion. With a further €1.5 billion spent by overseas visitors on fares to Irish carriers, taking foreign exchange earnings to €8 billion. Domestic tourism expenditure amounted to €3.6 billion, making tourism a €12 billion industry. The Central Statistics Office's estimates the number of people employed in 'Tourism Industries' to be 226,300 in Q3 2024 through an alternative method of estimating employment using PAYE tax data. Note that self-employed and primarily pensioners are excluded from the headcount.

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

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

The Republic of Ireland is divided into seven tourism regions. Table 5-7 shows the total revenue and breakdown of overseas tourist numbers to each region in Ireland during 2024 ('*Key Tourism Facts 2024*, Fáilte Ireland, 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	€1,168m	1,442
Mid-West	€536m	827
West	€847m	1,226
Border	**€376m**	**525**
Total	€6,169 m	9,448

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

The Border Region, in which the Site is located, comprises Counties Cavan, Donegal, Leitrim, Monaghan and Sligo. This Region benefited from approximately 5.3% of the total number of overseas tourists to the country and approximately 6.1% of the total tourism income generated in Ireland in 2024. The latest release by the CSO on tourism in Ireland 'Inbound Tourism October 2025'[25] released by the CSO in November 2025 provides a monthly snapshot of tourism in Ireland. As of October 2025, the number of overseas tourists between January and October 2025 was just over 5.4 million, which was a 6.4% decrease from 2024, with almost 5.8 million for the same period.

Although the data for 2024 or more recent years are not available, Table 5-8 presents the most recently published breakdown of overseas tourist numbers and revenue to the Border Region during 2017 ('*2017 Topline Tourism Performance by Region,* Fáilte Ireland, August 2018). As can be observed in Table 5-8, County Sligo had the second highest tourism revenue within the Region during 2017 at €96, which is significantly higher than the revenue recorded for the counties of Leitrim and Monaghan.

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

Region	Total Revenue (€m)	Total Number of Overseas Tourists (000s)
Cavan	€80m	313
Donegal	€178m	631
Leitrim	€50m	247
Louth	€85m	351
Monaghan	€55m	239
Sligo	€96m	420

Table 5-9 presents the breakdown of tourist numbers and revenue to County Sligo during 2024 ('*Sligo Key Tourism Facts 2024',* Fáilte Ireland, August 2025) [26]. The key activities which domestic holiday makers engaged in included walking, hiking touring by car, visiting houses/castles and visiting nature reserves/national parks.

Table 5-9 Tourism to Sligo Region during 2024 (Source: Fáilte Ireland)

County Sligo	Domestic Tourists
Revenue Generated (€m)	83
No. of Tourists (000s)	387,000
Average spend per capita (€)	215
Average nights spent in County	2.3

[25] *CSO (November 2025). Inbound Tourism October 2025. Available at: https://www.cso.ie/en/releasesandpublications/ep/p-ibt/inboundtourismoctober2025/*
[26] *Failte Ireland (2025) Sligo Key Tourism Facts 2024. Available at: https://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/Research/Key%20Tourism%20Facts%20and%20Figures%202024/FI_Key-Tourism-Facts-2024_Sligo.pdf?ext=.pdf*

5.4.2 Tourist Attractions

The Sligo Way is an identified tourist attraction pertaining within the Proposed Wind Farm. The varied natural landscape and scenic amenity of this area provides many opportunities for general outdoor recreation within the wider area. The route comprises an 80km route from the Ox Mountains to Dromahair in County Leitrim.[27] 7.2km of the trail passes through the Proposed Wind Farm, 3.3km via the L2702 local road, 1.6km along the L6309 local road 2.3km with the Existing Wind Farm and local access tracks. The Proposed Grid Connection Route passes under the Sligo Way for 2.3km along the L6309 local road. Diversion Routes for the construction phase of the Proposed Project along the Sligo Way are described in Chapter 4.

5.4.2.1.1 *Tourism Attractions within the surrounding landscape*

Key tourist attractions within County Sligo include Sligo Town, Mullaghmore Head, Streedagh beach, mountain ranges including Ox Mountains, Dartry Mountains, Benbulben and Tievebaun Mountain.

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

- Strandhill Village approximately 15km northeast to the nearest Proposed Turbine (T15) is a seaside village which provides walking trails into the foothills of the Knocknarea Mountain and water sport classes.
- Sligo Town located approximately 22km northeast of the Proposed Wind Farm at its closest point is offers a range of family activities including scenic walks along the Garavogue River and boat tours available of Lough Gill, Guided ‘William Butler Yeats Tours’ also.
- Lough Easky Loop offers a trail around the shoreline of Lough Easkey, which is situated in the heart of the Ox Mountain range approximately 2km south of the nearest Proposed Turbine (T05).
- Easkey Village is located approximately 11.5km northwest of the nearest Proposed Turbine (T06) which offers a range of walkways around the ruins of Roslee Castle, Easkey Abbey and Rathlee Tower.
- Enniscrone Town, located approximately 14.8km northwest of the nearest Proposed Turbine (T02), offers a range of activities including scenic walks along the banks of Killala Bay, guided boat tours, surfing schools and golf courses.
- Mulloughmore is a seaside resort town located approximately 28km north of the Proposed Grid Connection Route at is closest point and is known for its world-renowned surfing.
- Rosses Point is a picturesque village located approximately 10.8 km north of the Proposed Grid Connection Route at its closest point. The village offers a range of leisure activities, including the Rosses Point Coastal Trail for walking and cycling, the Hot Box Sauna, and local golf clubs. Coney Island, known for its sandy beaches and green fields, lies approximately 5 km west of Rosses Point.

The Proposed Project is not within any of the strategic tourism areas identified in the SCDP, however it does overlap with the Sligo Way trail tourist attraction and its scenic routes, SR-58 and SR-70, which traverses through the Site. Refer to Section 5.10.2.1.5 below and Chapter 13: Landscape and Visual for further details.

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

[27] https://www.sportireland.ie/outdoors/walking/trails/sligo-way

Chapter 14: Cultural Heritage provides details of the cultural heritage of the Site. Archaeological sites and monuments are part of Irish national heritage and are recognised tourist attractions across the country. National Monuments in state care within 15km of the nearest Proposed Turbine are listed below.

- Cairn – boundary cairn (SL019-171001; NM No. 523) is situated c. 7.7km to the southeast of the Proposed Turbine (T16),
- Moated site (SL013-048005; PO No. 2/1994) is located c 8.2km to the northeast of the Proposed Turbine (T13),
- Megalithic Tomb – passage tumb (SL036-001001; NM No. 479) is located c. 14.5km south of the Proposed Turbine (T05),
- Megalithic tomb – court tomb (SL036-003; PO No. 196/195) is located c. 14.7km south of the Proposed Turbine (T05).

5.4.3 Tourist Attitudes to Wind Farms

5.4.3.1 Scottish Tourism Study 2021

BiGGAR Economics undertook an independent study in 2021, entitled '*Wind Farms & Tourism Trends in Scotland: Evidence from 44 Wind Farms*'[28] to understand the relationship, if any, that exists between the development of onshore wind and the sustainable tourism sector in Scotland. In recent years, the onshore wind sector and sustainable tourism sector have grown significantly in Scotland. However, it could be argued that if there was any relationship between the growth of onshore wind energy and tourism, it would be at a more local level. This study therefore considered the evidence at a local authority level and in the immediate vicinity of constructed wind farms.

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

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

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

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

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

[28] *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>*

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.*"

5.4.3.2 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*'.[29]

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 positive impact on future visits to the island of Ireland. Of those who feel that a potentially*

[29] *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*>

> *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*'[30]. The updated survey found that of 1,000 domestic and foreign tourists who holidayed in Ireland during 2012, over half of tourists said that they had seen a wind turbine while travelling around the country. Of this number of tourists, 21% claimed wind turbines had a negative impact on the landscape. However, 32% said that it enhanced the surrounding landscape, while 47% said that it made no difference to the landscape. Almost three quarters of respondents claim that potentially greater numbers of wind farms would either have no impact on their likelihood to visit or have a strong or fairly strong positive impact on future visits to the island of Ireland.

Further details regarding the general public perception of wind energy, including those living in the vicinity of a wind farm, are presented in Section 5.5 below.

5.5 Public Perception of Wind Energy

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

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

5.5.1.1.1 *Background*

In May 2023 the Sustainable Energy Authority of Ireland (SEAI) published a report on the national survey they commissioned of people's opinions of new commercial solar or wind farm projects in Ireland.[31] 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.

---

[30] *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>*

[31] *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 publics support for Irelands energy transition.

5.5.1.2 Sustainable Energy Authority of Ireland Survey 2003

5.5.1.2.1 *Background*

The first wind farm in Ireland was completed in 1992 at Bellacorrick, Co. Mayo, by mid-2007 there were 67 wind farms and in 2024 there are almost 400 wind farms on the island of Ireland. Since 1992 wind farms have elicited a range of reactions from the Irish people.[32] In response, the SEAI (formerly SEI) commissioned a survey aimed at identifying public attitudes to renewable energy and to wind energy in Ireland.[33] The results of which were published in 2003 and updated in 2017 as a national survey entitled '*Attitudes Towards the Development of Wind Farms in Ireland*'. A catchment area survey was also carried out by to focus specifically on people living with a wind farm in their locality or in areas where wind farms are planned.

2003 Findings

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

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

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

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

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

---

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

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 development and that wind farms are not solely seen as good in theory, but are also seen as beneficial when they are actually built."*

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

5.5.1.3 Survey Update 2017

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

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

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

The final section of the 2017 report states:

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

5.5.1.4 Conclusions

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

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

5.5.2.1 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).[34] The aims of the study were to ascertain the extent to which people support or oppose wind power, to investigate the reasons for these attitudes and to establish how public attitudes relate to factors such as personal experience of operational wind farms and their proximity to them.

5.5.2.2 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.

5.5.2.3 Findings

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

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

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

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

---

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

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

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

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

5.5.2.4 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.

5.5.3 Wind Energy Ireland National Polls on Wind Energy

5.5.3.1 IWEA Interactions Opinion Poll on Wind Energy 2019

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

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

5.5.3.2 Wind Energy Ireland Public Attitudes Monitor 2022

Published in December 2022, IWEA undertook a national opinion poll on Wind Energy in Q4 of 2022 with the objective '*to measures & track the perceptions and attitudes around wind energy amongst Irish* *adults*'. Between November 23rd and December 8th 2022, a nationally represented sample of 1,017 and a booster sample of 201 rural dwellers participated in the survey. The 2022 results indicate that 80% of the nationally representative sample and 85% of the rural sample strongly favour or favour wind power. Almost half (45%) of those surveyed ranked cheaper electricity as the top wind energy benefit. Amongst rural residents, the percentage of people producing negative feedback is reducing year on year. Nationally, 58% of people said that they would be in favour of a wind farm in their area, which is the highest number in favour since tracking began. Amongst rural residents, just 1 in 10 people registered being opposed to having a wind farm in their local area.

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

5.5.3.3 WEI Interactions Opinion Poll on Wind Energy 2023

In early 2023, Wind Energy Ireland (WEI) published the results of their most recent nationwide annual poll on attitudes to wind energy, the Public Attitudes Monitor.[35] The objective of the poll was to '*measure and track public perceptions and attitudes around wind energy amongst Irish adults*.'

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

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

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

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

5.5.3.4 Wind Energy Ireland Public Attitudes Monitor 2024

In late 2024, WEI published the results of their most recent nationwide annual poll on attitudes to wind energy, the Public Attitudes Monitor[36]. The objective of the poll was to "*measure and track public perceptions and attitudes around wind energy across ROI*".

[35] https://windenergyireland.com/about-wind/more-resources/annual-wind-survey
[36] *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

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 CO_2 emissions", "good for the environment", "supports energy independence", "creates employment", and "good for local communities".

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

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

5.5.3.5 Conclusion

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

5.6 Health Effects of Wind Farms

5.6.1 Health Impact Studies

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

1. ***'Wind Turbine Sound and Health Effects – An Expert Panel Review',*** *American Wind Energy Association and Canadian Wind Energy Association, December 2009*[37]

In 2009, an Expert Panel on behalf of the American Wind Energy Association 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:

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

- "*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 2010*[38]

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

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

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

3. ***'The Health Effects of 72 Hours of Simulated Wind Turbine Infrasound: A Double-Blind Randomized Crossover Study in Noise-Sensitive Health Adults'*** *Woolcock Institute for Medical Research, New South Wales Australia*[39]

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:

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

- All staff and participants were asked whether they were able to differentiate in any way between infrasound and sham infrasound (the control), and none of them were able to.
- The study found that 72 hours of the simulated wind turbine infrasound (~90dB pk re 20 µPa) in controlled laboratory conditions did not worsen any measure of sleep quality compared with the same speakers being present but not generating infrasound (sham infrasound).
- The study found no evidence that 72 hours of exposure to a sound level of ~90dB pk re 20 µPa of simulated wind turbine infrasound in double-blind conditions perturbed any physiological or psychological variable.
- None of the participants in the study who were exposed to infrasound developed what could be described as WTS.
- This study suggests that the infrasound component of WTS is unlikely to be a cause of any ill-health or sleep disruption, although this observation should be independently replicated.

4. ***'A Rapid Review of the Evidence',*** *Australian Government National Health and Medical Research Council (NHMRC) Wind Turbines & Health, July 2010*[40]

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

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

5. ***'Position Statement on Health and Wind Turbines',*** *Climate and Health Alliance, February 2012*[41]

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

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

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

[40] 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
[41] 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

"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)* [42]

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

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

"There is no evidence for a set of health effects, from exposure to wind turbines that could be characterized as a "Wind Turbine Syndrome."

The strongest epidemiological study suggests that there is not an association between noise from wind turbines and measures of psychological distress or mental health problems. There were two smaller, weaker, studies: one did note an association, one did not. Therefore, we conclude the weight of the evidence suggests no association between noise from wind turbines and measures of psychological distress or mental health problems.

None of the limited epidemiological evidence reviewed suggests an association between noise from wind turbines and pain and stiffness, diabetes, high blood pressure, tinnitus, hearing impairment, cardiovascular disease, and headache/migraine."

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

"Scientific evidence suggests that shadow flicker does not pose a risk for eliciting seizures as a result of photic stimulation.

[42] https://www.mass.gov/doc/wind-turbine-health-impact-study-report-of-independent-expert-panel/download

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)* [43]

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.* [44]

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 day-evening-night noise level (Lden). The GDG recognise the potential for increased risk of annoyance at levels below this value but cannot determine whether this increased risk can impact health. Wind turbine noise above this level is associated with adverse health effects.

The GDG points out that evidence on health effects from wind turbine noise (apart from annoyance) is either absent or rated low/very low quality. Furthermore, public perception towards wind turbines are

[43] https://pubmed.ncbi.nlm.nih.gov/25376420/
[44] https://www.who.int/europe/publications/i/item/9789289053563

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.* [45]

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

As a result:

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

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

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

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

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

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

5.6.2 Turbine Safety

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

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

The International Electrotechnical Commission (IEC) is a global organization that develops and publishes international standards for electrical and electronic technologies. One of the areas where the IEC has played a significant role is in the standardization of wind turbines. The IEC has developed a series of standards specifically for wind turbines, which cover various aspects such as design, testing, and performance. The IEC 61400-1 "*Wind turbines – Part 1: Design requirements*"[46] 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 and wood which will prevent any likelihood of an increase in lightning strikes within the Site or the local area. Lightning protection conduits will be integral to the construction of the turbines. Lightning conduction cables, encased in protection conduits, will follow the electrical cable run, from the nacelle to the base of the turbine. The conduction cables will be earthed adjacent to the turbine base. The earthing system will be installed during the construction of the turbine foundations.

5.6.3 Electromagnetic Interference

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

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

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)[47] provides further practical information on EMF.

Further details on the potential effects of electromagnetic interference to telecommunications and aviation are presented in Section 15.2.3.4 of Chapter 15: Material Assets.

5.6.4 Effects on Human Health

As set out in the Department of Housing, Planning, Community and Local Government '*Key Issues Consultation Paper on the Transposition of the EIA Directive 2017*' [48]and the guidance listed in Section 1.2.1 of Chapter 1: Introduction, the consideration of the effects on populations and on human health should focus on health issues and environmental hazards arising from the other environmental factors, for example water contamination, air pollution, noise, accidents, disasters.

Chapter 5: Population and Human Health (including Shadow Flicker), Chapter 8: Land, Soils and Geology, Chapter 9: Hydrology and Hydrogeology, Chapter 10: Air Quality, Chapter 11: Climate, Chapter 12: Noise and Vibration and Chapter 15: Material Assets provide an assessment of the effects of the Proposed Project on these areas of consideration. 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. The Proposed Wind Farm overlies the Collooney Groundwater Body (GWB) and the Easky East GWB. The bedrock type of the Collooney GWB is predominantly Precambrian Quartzites, Gneisses & Schists bedrock which are classified by the GSI as a Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones (PI). The bedrock type of the Easky East GWB is predominantly Dinantian Pure Bedded Limestones and Dinantian Upper Impure Limestones, which also underlies the northwestern portion of the Proposed Wind Farm. The Glencar Limestone Formation and the Ballina Limestone Formation (Upper) which underlie the northwestern area of the Proposed Wind Farm are comprised of dark fine limestone and calcareous shale, and grey limestone and thin shale respectively. The GSI has classified the Glencar Limestone Formation as a Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones (LI), while the Ballina Limestone Formation (Upper) has been classified as Regionally Important Aquifer – Karstified (RK). The Proposed Grid Connection Route is also located within the Collooney GWB along with the Beltra-Sligo GWS, Carrowmore West and Ballygawley GWB which are all classified as karstic. The eastern end of the Proposed Grid Connection Route is located in the Lavagh-Ballintougher GWB which is classified as 'poorly productive bedrock'. Chapter 9: Hydrology and

---

[47] *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.*

[48] *Department of Housing, Planning, Community and Local Government (2017) 'Key Issues Consultation Paper on the Transposition of the EIA Directive 2017'. Available at: https://www.publichealth.ie/sites/default/files/resources/IPH%20response%20to%20the%20key%20issues%20consultation%20paper%20on%20Transposition%20of%20EIA%20Directive%20201452EU.pdf*

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

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

A wind farm is not a recognised source of pollution. It is not an activity which requires Environmental Protection Agency 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.

The Proposed Project is for the development of a renewable energy project, a wind farm, capable of offsetting carbon emissions associated with the burning of fossil fuels. During the operational stage the Proposed Wind Farm 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. SSE Renewables 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.

5.6.5 Vulnerability of the Proposed Project to/from 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 5.6.5 above, a wind farm is not a recognised source of pollution. Should a major accident or natural disaster occur, the potential sources of pollution onsite during the construction, operational and decommissioning phases, are limited. Sources of pollution with the potential to cause significant environmental pollution and associated negative effects on health, such as bulk storage of hydrocarbons or chemicals, storage of wastes etc., are limited.

In the context of the Proposed Project, there is limited potential for significant natural disasters to occur. Ireland is a geologically stable country with a mild temperate climate. The potential natural disasters that may occur are therefore limited to peat instability, flooding and fire. The risk of peat instability and failure (landslide) occurring on the Site is addressed in the Geotechnical and Peat Stability Assessment Report included in Appendix 8-1 of this EIAR which concludes that the Proposed Wind Farm has an acceptable margin of safety and is suitable for wind farm development. The risk of flooding and potential for contamination of groundwater and drinking water due to the construction of the Proposed Project is addressed in Chapter 9: Hydrology and Hydrogeology, with the risk being limited due to the proposed mitigation measures and site drainage plan, meaning there is limited risk to human health. It is considered that the risk of significant fire occurring, affecting the wind farm and causing the wind farm to have significant environmental effects is limited and therefore a significant effect on human health is similarly limited. As described earlier, there are no significant sources of pollution in the wind farm with the potential to cause environmental or health effects. Also, the spacing of the turbines and distance of turbines from any properties limits the potential for effects on human health. The issue of turbine safety is addressed in Section 5.6.3.

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 European Refreshments, located in Ballina, Co. Mayo, approximately 20km west from the Site at its closest point. A Major Accidents and Natural Disasters assessment is included as Chapter 16.

5.7 Property Values

5.7.1 Property Values and Wind Farms

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

One of the largest studies of the impact of wind farms on property values has been carried out in the United States. '*The Impact of Wind Power Projects on Residential Property Values in the United States: A multi-Site Hedonic Analysis*', December 2009, was carried out by the Lawrence Berkley National Laboratory (LBNL) for the U.S Department of Energy[49]. This study collected data on almost 7,500 sales of single-family homes situated within approximately 16km (ten miles) of 24 existing wind farms in nine different American states over a period of approximately ten years. The conclusions of the study are drawn from eight different pricing models including repeat sales and volume sales models. Each of the homes included in the study were visited to demonstrate the degree to which the wind facility was visible at the time of the sale, and the conclusions of the report state that *"The result is the most comprehensive and data rich analysis to date on the potential impacts of wind energy projects on nearby property values."*

The main conclusion of this study is as follows:

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

This study has been updated by LBNL who published a further paper entitled "*A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States*", in August 2013[50]. 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 approximately 16km (10 miles) of the wind energy facilities - about 1,100 homes were within approximately 1.6km (1 mile), with 331 within approximately 800m (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:

---

[49] *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

[50] *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

> *"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*.'[51] This study targeted urban counties in the United Stated with populations over 250,000 persons, and found that on average, after a commercial wind energy project is announced, houses located within approximately 1.6km (1 mile) of a proposed wind energy project experience a decrease in value of 11% relative to homes located within approximately 4.8-8km (3-5 miles) of the proposed wind energy project. The decline in property values was found to recover post construction with property value impacts becoming relatively small (~2%) and statistically insignificant 9 years or more after project announcement (roughly 5 years after operation begins). This suggests that the housing market is reacting negatively to the expectation of likely impacts (after announcement) and the heightened activity during construction, but after operation begins, those negative perceptions and related home price impacts appear to fade.

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

A study was commissioned by RenewableUK and carried out by the Centre for Economics and Business Research (Cebr) in March 2014. The findings of the study were produced in a report titled '*The Effect of Wind Farms on House Prices*'[52]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) [53] was published by Climate Exchange. Climate Exchange is Scotland's independent centre of expertise on climate change which exists to support the Scottish Governments policy development on climate and the transition to a low carbon economy.

The most recent review which has been published in July 2025 by RenewableUK '*Do wind farms affect house prices*?'[54] looks at the research which has been conducted in recent years to assess the concerns brought upon by the growing development of renewable energy infrastructure (wind turbines and above ground grid infrastructure) across the UK. The review concludes that there are a complex number of factors influencing house prices which play a much more significant role than the presence of wind farm of above ground electricity infrastructure. Based on the review of available research across the UK, there is no supporting evidence which supports the hypothesis that renewable energy infrastructure negatively affects long-term property values in the UK.

---

[51] *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*
[52] *RenewableUK, Cebr (2014) The Effect of Wind Farms on House Prices. Available at: https://tethys.pnnl.gov/sites/default/files/publications/RenewableUK_2014.pdf*
[53] *Climate Exchange (2016) Impact of wind Turbines on House Prices in Scotland. Available at: https://www.climatexchange.org.uk/wp-content/uploads/2023/09/cxc_wind_farms_impact_on_house_prices_final_17_oct_2016.pdf*
[54] *RenewableUK (July 2025). Blog post: Do wind farms affect house prices?. Available at: https://www.renewableuk.com/news-and-resources/blog/do-wind-farms-affect-house-prices/*

The 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.

5.7.2 Property Values and Grid Infrastructure

In May 2016, EirGrid conducted a literature review and evidence-based field study on the effects of high voltage transmission development on patterns of settlement and land use. The objectives of '*EirGrid Evidence Based Environmental Studies Study 9: Settlement and land use*[55] were to:

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

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

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 Route will have a significant effect on property values.

[55] *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

5.8 Residential Amenity

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

The Proposed Wind Farm is located on the northwest slopes of the Ox Mountains, located approx. 4.5km south of the village of Dromore West, and approx. 3km southwest of the village of Templeboy in Co. Sligo, at their nearest points. As noted previously, renewable energy infrastructure is an established land-use in the area of the Site. In addition to the Existing Wind Farm and Existing Grid Connection, land-cover on the Proposed Wind Farm primarily comprises peat bog, peat/turf cutting and coniferous forestry in the west, north-west, east and south of the Site. South of the Proposed Wind Farm comprises largely of transitional wood scrub, while land-use in the northern end of the site comprises largely of pastoral agriculture and low-density residential. Current land-use along the Proposed Grid Connection Route comprise public road corridor, pastures, low density residential, industry, commercial forestry and land principally used for agriculture with significant areas of natural vegetation.

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 below refers to the shadow flicker assessment, Section 12.6 of Chapter 12 addresses noise and vibration). A comprehensive landscape and visual impact assessment have also been carried out, as presented in Chapter 13 of this EIAR. Impacts on the local population during the construction, operational and decommissioning phases of the 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 5.10 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 18 no. properties located within 1 kilometre of the Proposed Turbines. Of these 18 no. properties, 4 no. are derelict properties. All sensitive receptors achieve the recommended 4 times the maximum tip height setback (720m) from properties not involved in the Proposed Project (as recommended in the Draft DoEHLG 2019 Guidelines) and the minimum recommended setback for properties involved in the Proposed Project (500m). The turbine locations thus adhere to the DoEHLG 2006 Guidelines and Draft DoEHLG 2019 Guidelines in relation to turbine setback: a minimum 500m set back from sensitive receptors and a minimum setback of four times the tip height of the Proposed Turbines.

5.9 Shadow Flicker Assessment Results

5.9.1 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 theoretical precautionary conditions. Following the detail provided above on sunshine hours, a sunshine factor of 24.4% 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 5-10.

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

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

The predicted shadow flicker levels have been modelled for all 40 no. properties located within the Shadow Flicker Study Area, which the results are shown in Table 5-10. The predicted shadow flicker model results indicate:

- 3 no. properties are theoretically predicted to experience zero shadow flicker;
- 37 no. properties are theoretically predicted to experience some shadow flicker;
    - It should be noted that of these 37 no. properties, 21 no. properties are predicted to experience effects in excess of the 30-minute shadow flicker threshold..
    - Of the 21 no. properties, 4 no. are in derelict condition. As a result, no mitigation measures are required for these 4 no. derelict properties. Therefore, 17 no. properties will require mitigation measures. Please see Table 5-11 below for mitigation details.
- The annual threshold of over 30 hours for shadow flicker (Guidelines (DoEHLG, 2006)) is predicted to be exceeded at 2 no. properties once the regional sunshine average factor of 24.4% has been considered.
    - Of these 2 no. properties, 1 no. is in derelict condition, therefore mitigation measures are not required. Please see Table 5-11 below for mitigation details.

It is worth noting that the predicted exceedances of shadow flicker listed in Table 5-10 is considered conservative and in reality, the occurrence and/or duration of shadow flicker at these properties is likely to be eliminated or significantly reduced as the following items are not considered by the model:

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

Section 5.10.3.2.7 below details the mitigation measures which will be employed at the potentially affected properties to ensure that the current adopted Guidelines (DoEHLG, 2006) are complied with at any property within the Shadow Flicker Study Area. The same mitigation measures (with stricter implementation of shadow flicker controls) can be implemented so that that the Proposed Turbines can be operated in accordance with the shadow flicker requirements of the Draft Guidelines (DoHPLG, 2019), should they be adopted as currently proposed, while the planning application is being determined.

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

5.9.1.1 Comparative Shadow Flicker Assessment

A comparative assessment was undertaken where turbines with alternative dimensions within the proposed range, as detailed in Section 1.7.3 of Chapter 1 and Section 4.3.2.1.3 of Chapter 4 of the EIAR, were modelled and compared against Scenario 1 as set out in Section 5.8.4 and Table 5-10. The four comparative modelled turbines are as follows:

- **Scenario 1:** Tip Height (180m), Hub Height (105m), Rotor Diameter (150m)
- **Scenario 2:** Tip Height (179.5m), Hub Height (105m), Rotor Diameter (149m)
- **Scenario 3:** Tip Height (176.6m), Hub Height (110m), Rotor Diameter (133.2m)

For all turbines modelled, the Shadow Flicker Study Area remained unchanged at 1.5km. The summary of assessment results is presented in Appendix 5-2: Comparative Shadow Flicker Assessment.

The results of this comparative assessment support the consideration that a theoretical precautionary scenario for potential shadow flicker effects is the Scenario 1 (identified above).

Table 5-10 Maximum Potential Daily & Annual Shadow Flicker – Proposed Crumhach Wind Farm, Co. Sligo.

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)
1	544958	829578	derelict	730	T7	01:13:00	93:44:00	22:54:45	T6, T7, T8	Yes	No
2	545934	829097	dwelling	728	T10	01:18:00	147:56:00	36:09:41	T7, T8, T9, T10, T11, T12	Yes	Yes
3	545958	829173	derelict	800	T10	01:11:00	127:36:00	31:11:28	T7, T8, T9, T10, T11, T12	Yes	Yes
4	545241	829434	dwelling	815	T8	00:41:00	66:27:00	16:14:36	T7, T8, T10	Yes	No
5	543464	829087	water treatment plant	812	T6	00:39:00	45:56:00	11:13:41	T6, T7	Yes	No
6	547375	830027	dwelling	731	T13	00:51:00	54:43:00	13:22:31	T12, T13	Yes	No
7	545149	829608	dwelling	879	T7	00:37:00	36:35:00	8:56:33	T7	Yes	No
8	547849	829933	dwelling	772	T13	00:51:00	66:41:00	16:18:01	T12, T13	Yes	No
9	547815	829970	dwelling	785	T13	00:47:00	64:55:00	15:52:07	T12, T13	Yes	No
10	546932	829944	dwelling	806	T13	00:39:00	50:00:00	12:13:20	T12, T13	Yes	No
11	544874	829810	dwelling	889	T7	00:48:00	33:19:00	8:08:39	T7, T8	Yes	No
12	545964	829256	dwelling	882	T10	01:02:00	108:04:00	26:24:59	T8, T9, T10, T11, T12	Yes	No
13	546624	829710	dwelling	890	T13	00:34:00	50:46:00	12:24:35	T10, T11, T12, T13	Yes	No

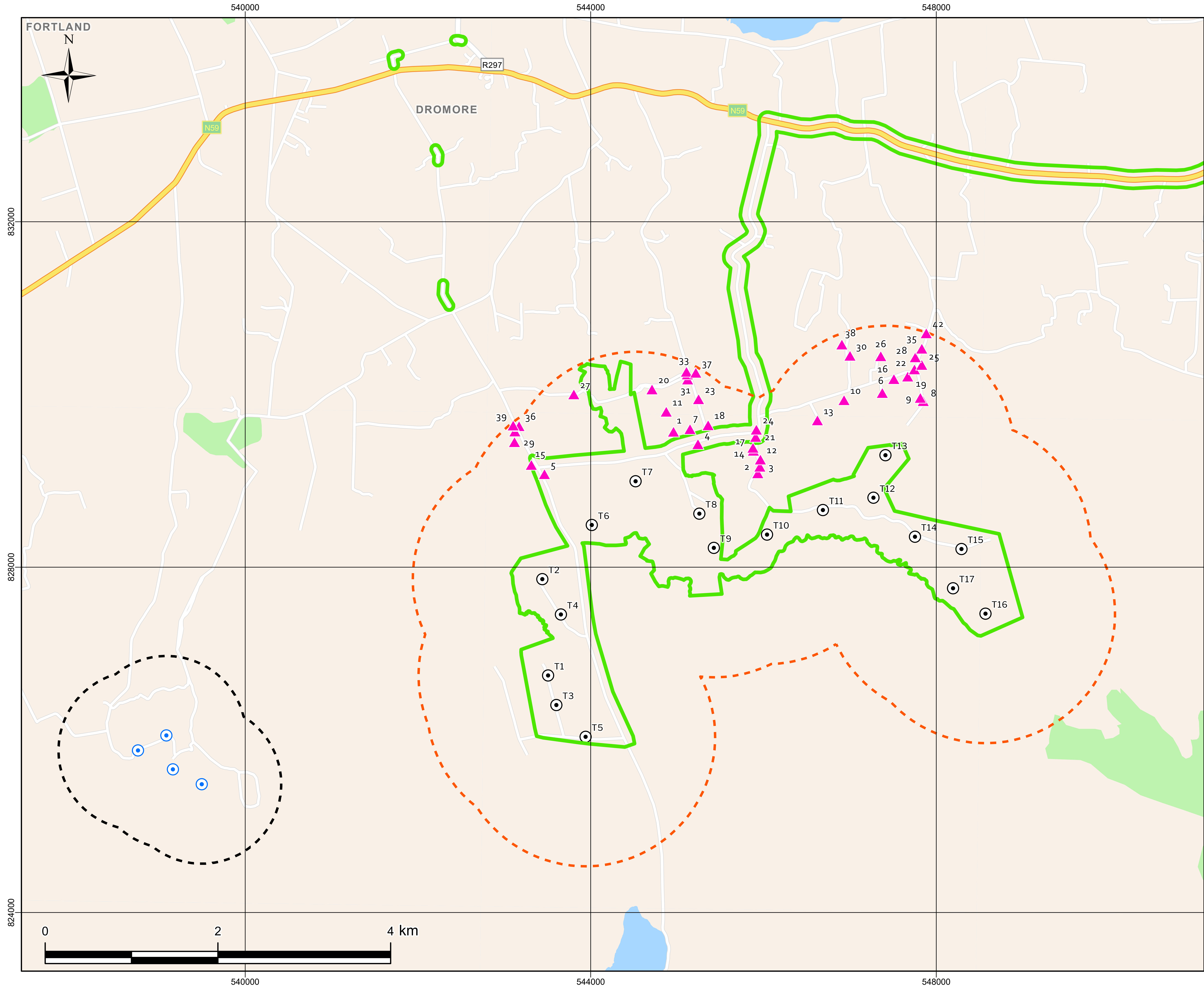
House ID	ITM Coordinates (Easting)	ITM Coordinates (Northing)	Description	Distance to Nearest Turbine (metres)	Nearest Proposed Turbine No.	Max. Daily Shadow Flicker: Pre-Mitigation (hrs:min:sec)	Max. Annual Shadow Flicker: Pre-Mitigation (hrs:min:sec)	Max. Annual Shadow Flicker Adjusted for Average Regional Sunshine (hrs:min:sec)	Proposed Turbine(s) Giving Rise to Daly Shadow Flicker Exceedance	Mitigation Strategy Required (Daily)	Mitigation Strategy Required (Annual)
14	545883	829358	derelict	968	T8	00:54:00	87:48:00	21:27:44	T7, T8, T9, T10, T11, T12	Yes	No
15	543312	829194	dwelling	994	T6	00:32:00	32:15:00	7:53:00	T6	Yes	No
16	547509	830188	derelict	897	T13	00:37:00	31:17:00	7:38:49	T13	Yes	No
17	545878	829392	dwelling	991	T8	00:51:00	75:42:00	18:30:16	T8, T10, T11	Yes	No
18	545359	829653	dwelling	1038	T8	00:30:00	36:21:00	8:53:08	T7	No	No
19	547669	830217	dwelling	956	T13	00:35:00	30:38:00	7:29:17	T13	Yes	No
20	544709	830068	dwelling	1090	T7	00:00:00	0:00:00	0:00:00	N/A	No	No
21	545909	829518	dwelling	1110	T8	00:40:00	56:32:00	13:49:09	T8, T10, T11	Yes	No
22	547747	830300	dwelling	1058	T13	00:31:00	25:08:00	6:08:37	T13	Yes	No
23	545248	829955	dwelling	1205	T7	00:28:00	27:59:00	6:50:25	T7	No	No
24	545917	829602	dwelling	1183	T8	00:39:00	43:02:00	10:31:09	T8, T11	Yes	No
25	547832	830352	dwelling	1136	T13	00:30:00	23:12:00	5:40:16	T13	No	No
26	547357	830453	dwelling	1158	T13	00:16:00	4:59:00	1:13:05	N/A	No	No
27	543804	830011	dwelling	1243	T7	00:27:00	27:03:00	6:36:44	T7	No	No
28	547757	830440	dwelling	1194	T13	00:25:00	13:43:00	3:21:11	N/A	No	No
29	543117	829458	derelict	1320	T6	00:24:00	22:30:00	5:30:00	N/A	No	No
30	547001	830458	dwelling	1232	T13	00:26:00	16:55:00	4:08:07	N/A	No	No
31	545122	830183	dwelling	1332	T7	00:15:00	5:09:00	1:15:32	N/A	No	No
32	545119	830242	dwelling	1384	T7	00:00:00	0:00:00	0:00:00	N/A	No	No
33	545108	830272	dwelling	1406	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)
34	543122	829581	dwelling	1409	T6	00:24:00	18:30:00	4:31:20	N/A	No	No
35	547832	830540	dwelling	1312	T13	00:22:00	11:05:00	2:42:33	N/A	No	No
36	543170	829643	dwelling	1429	T6	00:23:00	29:47:00	7:16:49	N/A	No	No
37	545216	830261	dwelling	1445	T7	00:14:00	4:10:00	1:01:07	N/A	No	No
38	546907	830588	dwelling	1387	T13	00:21:00	11:18:00	2:45:44	N/A	No	No
39	543102	829650	dwelling	1476	T6	00:23:00	20:26:00	4:59:41	N/A	No	No
42	547884	830718	dwelling	1498	T13	00:11:00	2:50:00	0:41:33	N/A	No	No

5.9.2 Cumulative Shadow Flicker

For the assessment of cumulative shadow flicker, any other existing, permitted or proposed wind farms are considered where the permitted or Proposed Project 's ten times rotor diameter shadow flicker study area overlaps with the Shadow Flicker Study Area of the Proposed Turbines. As clarified in Section 1.1 in Chapter 1 of this EIAR, the existing Dunneill Wind Farm and existing Kingsmountain Wind Farm are located within the Site. The Existing Wind Farm turbines will be removed as part of the Proposed Project.

In this case, the closest wind farm to the Proposed Project is the existing Black Lough Wind Farm, of which have a turbine rotor diameter of 92 meters, is located approximately 4.2km southwest of the Proposed Turbines. As such, the ten times rotor diameter shadow flicker study area (92m x 10 = 920m) for the existing Black Lough Wind Farm would not overlap with that of the Proposed Turbines ten times rotor diameter Shadow Flicker Study Area (i.e 1.5km from the Proposed Turbines). At this distance, any potential properties that would be considered within the existing Black Lough Wind Farm shadow flicker study area are excluded from the Proposed Turbines Shadow Flicker Study Area and therefore are beyond the range for potential cumulative shadow flicker impacts. Please see Figure 5-7 below. Therefore, there is no potential for shadow flicker in combination with the Proposed Turbines and therefore no cumulative shadow flicker assessment is required.



Map Legend

- EIAR Site Boundary
- Proposed Turbines
- Sensitive Receptors
- Proposed Project Shadow Flicker Study Area - 1.5km (10x150m Rotor Diameter)
- Existing Black Lough Turbines
- Existing Black Lough Wind Farm Shadow Flicker Study Area - 920m (10x92m Rotor Diameter)

SITE LOCATION - NOT TO SCALE

Drawing Title
Cumulative Shadow Flicker Study Area

Project Title
Crumhach Wind Farm, Co. Sligo

Project No.	Drawing No.	Scale
230841	5-7	1:40,000
Drawn By	Checked By	Date
MVN	BT	06/08/2026

MKO

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

5.10 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, air quality (dust and exhaust emissions), climate, water quality, noise and vibration, traffic and transport, major accidents and natural disasters, and shadow flicker, and interference with telecommunications systems and EMF during the construction, operation, and decommissioning phases, as a result of the Proposed Project .

5.10.1 'Do-Nothing' Scenario

An alternative land use option to repowering the Existing Wind Farm as part of the Proposed Project would be to leave the Existing Wind Farm as it is, with no changes made to the existing operating 23 no. wind turbines within the Existing Wind Farm. In doing so, environmental effects in terms of emissions are likely to be neutral for the short term, however 13 no. of the existing turbines (existing Dunneill Wind Farm) are due to be decommissioned in accordance with their planning permissions in 2039. Once the 13 no. turbines are decommissioned, there will be a negative effect on greenhouse gas emissions. The 10 no. turbines which were commissioned in 2003 will be left in situ (existing Kingsmountain Wind Farm). However, these machines are aging and are not as efficient as the newer machines. Although these turbines do not have a decommissioning date, they will eventually break down and have to be decommissioned. The opportunity to continue capturing the available renewable energy resource with the Existing Wind Farms would be lost.

An alternative land use option to developing a renewable energy project in the greenfield sections of the Proposed Wind Farm (i.e areas of the Proposed Wind Farm located outside the footprint of the Existing Wind Farm) would be to leave the area as it is with no changes made to the current land use practices of commercial forestry, peat/turf cutting, and public road corridor.

In implementing the 'Do-Nothing' alternative, however, the opportunity to capture a significant part of Co. Sligo's renewable energy resource would be missed, as would the opportunity to contribute to meeting Government and EU 2030 targets for the production and consumption of electricity from renewable resources and the reduction of greenhouse gas emissions. The opportunity to generate local employment, development contributions, and rates would also be forgone. Furthermore, the opportunity to implement the measures outlined in the Biodiversity Management and Enhancement Plan (BMEP) as outlined in Appendix 6-4 would also be lost.

5.10.2 Construction Phase

Within this section, the impact will consider the removal of the Existing Wind Farm turbines and construction of the Proposed Project i.e. the Proposed Wind Farm and the Proposed Grid Connection Route, as a whole. Furthermore, the proposed BMEP measures will also be considered during the construction phase. Full details on the construction phase methodologies for the Proposed Project are outlined in the Construction Environmental Management Plan (Appendix 4-5). Where the Proposed Wind Farm and the Proposed Grid Connection Route are required to be considered separately, this is identified within the assessment.

5.10.2.1 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.

5.10.2.1.1 *Population Levels*

Pre-Mitigation Impacts

Proposed Project

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.

5.10.2.1.2 *Employment and Investment*

Pre-Mitigation Impacts

Proposed Project

The construction of the Proposed Wind Farm will provide employment for technical consultants, contractors and maintenance staff. As discussed, it is proposed to construct the Proposed Wind Farm and Proposed Grid Connection Route concurrently which would require approximately 100 employees in total, with the majority of these roles focused on the construction phase of the Proposed Wind Farm The construction phase of the 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.

5.10.2.1.3 *Land Use Patterns & Activities*

Pre-Mitigation Impacts

Proposed Wind Farm

In addition to the Existing Wind Farm, land-use on the Proposed Wind Farm primarily comprises peat bog, with coniferous forest to the north-west, east and south of the site. South of the Proposed Wind Farm comprises largely of transitional wood scrub, while land-use in the northern end of the site comprises largely of pastoral agriculture and low-density residential.

The existing land-use of commercial forestry will continue on the site Proposed Wind Farm. However, as stated in Section 4.3.2.12 of Chapter 4, 29.3ha (hectares) of commercial forestry within the Site will be felled as part of the Proposed Wind Farm. This will be the subject of a Limited Felling Licence (LFL) application to the Forest Service in accordance with the Forestry Act 2014 and the Forestry Regulations 2017 (SI 191/2017) and as per the Forest Service's policy on granting felling licenses for wind farm developments. The replacement of the 29.3ha of forestry felled as part of the Proposed Wind Farm may occur on any lands, within the State benefitting from Forest Service Technical Approval for afforestation, should the Proposed Wind Farm receive planning permission. Please see Section 4.3.2.12.2 in Chapter 4, Chapter 6: Biodiversity and Appendix 6-4 Biodiversity Management and Enhancement Plan (BMEP) for details on conifer woodland replanting. Whilst there will be a change of land use in these areas to facilitate the development of the Proposed Turbines and infrastructure, this is an acceptable and unavoidable part of the Proposed Project.

The existing land-use practices of residential peat/turf cutting and commercial forestry will continue throughout the remainder of the Site in conjunction with the operational phase of the Proposed Project.

During the construction phase there will be interference with peat/turf cutting at the construction areas of Proposed Project development footprint located in cutover peat. There will also be slight interference with agricultural practices where farm practices may be redirected to other fields temporarily. As well, the removal of 29.3ha of conifer plantation will result in a change of land use of these areas. The Proposed Wind Farm will therefore have a short-term slight negative direct effect, which is not significant, on land use.

Proposed Grid Connection Route

Current land-use along the Proposed Grid Connection Route comprise public road corridor, pastures, low density residential, industry, commercial forestry and land principally used for agriculture with significant areas of natural vegetation. Within the Proposed Wind Farm, the Proposed Grid Connection Route underground electrical cabling route will follow a proposed new access track from the proposed onsite 110kV substation onto the L2702 local road.

Local temporary traffic disruptions are likely along the Proposed Grid Connection Route; however, once the construction of each element is complete traffic flow will resume as normal along public roads. This will have a short-term slight negative direct effect, which is not significant.

During the construction phase there may be slight interference with agricultural practices where farm practices may be redirected to other fields temporarily. This will have a short-term slight negative direct effect, which is not significant.

Potential impacts related to traffic and transport during the construction phase are assessed in Section 5.10.2.2.5 below and in Section 15.1.5.1 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 Route will be undertaken in a rolling construction method with 100–200m of road constructed and back filled each day providing access in the evenings and night hours along the Proposed Grid Connection Route.
- A Traffic Management Plan, agreed with the Local Authority, will be in place for the construction phase of the Proposed Grid Connection Route.
- In advance of any construction works the Applicant will actively engage with the local community on construction phase activities and programming. Information will include the contact details of the Project Co-ordinator, who will be the main point of contact for all queries from the public or local authority during normal working hours. An "out of hours" emergency number will also be provided.

Residual Effects

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

Significance of Effects

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

5.10.2.1.4 *Property Values*

Pre-Mitigation Impacts

Proposed Wind Farm

As noted in Section 5.7.1 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 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 5.7.1, 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 Wind Farm.

Proposed Grid Connection Route

As noted in Section 5.7.2 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. Therefore, there is no potential for the Proposed Grid Connection Route 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 Wind Farm 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 Wind Farm is Not Significant.

5.10.2.1.5 Tourism

Pre-Mitigation Impact

Proposed Wind Farm

The Sligo Way is an identified tourist attraction pertaining to the Proposed Wind Farm. The varied natural landscape and scenic amenity of this area provide many opportunities for general outdoor recreation within the wider area. 7.2km of the trail passes through the Proposed Wind Farm, 3.3km via the L2702 local road, 1.6km along the L6309 local road and 2.3km within the Existing Wind Farm and local access tracks. This will result in a negative, short-term, slight effect which is not significant.

Wind energy is an established land-use in the area of the Site. In addition to the Existing Wind Farm, land-cover on the Proposed Wind Farm primarily comprises peat bog, with coniferous forest to the north-west, east and south of the site. South of the Proposed Wind Farm comprises largely of transitional wood scrub, while land-use in the northern end of the site comprises largely of pastoral agriculture and low-density residential. It is noted that the landscape has been subject to substantial levels of human interference and modification.

With regard to tourist attractions and amenity use surrounding the Proposed Wind Farm, described in Section 5.4 above, traffic management safety measures will be in place, where required. Please see Section 5.10.2.2.5 below for traffic impact mitigation measures and Section 15.1.15.5 of Chapter 15: Material Assets for mitigation measures relating to the Proposed Wind Farm.

Proposed Grid Connection Route

The Sligo Way is an identified tourist attraction pertaining to the Proposed Grid Connection Route. The Proposed Grid Connection Route passes under the Sligo Way for 2.3km along the L6309 local road. Diversion routes during the construction phase are detailed in Section 15.1.8.1 of Chapter 15: Material Assets. Furthermore, the infrastructure associated with the Proposed Grid Connection Route is located within private property, therefore no entrance to tourists is currently or will be permitted. This will result in a negative, short-term, slight effect which is not significant effect.

There are no other tourist attractions located along the Proposed Grid Connection Route. The Proposed Grid Connection Route is located within the public road network for the majority of its length, 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 Proposed Grid Connection Route on the local road network, and the R290 and R284 regional road; please See Section 4.3.3.1 of Chapter 4 for further information on the proposed roads to be utilised for the Proposed Grid Connection Route. However, should tourists want to utilise portions of any of these roads, the laying of cables will be carried out in a rolling nature at an average rate of 100m to 200m 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.

Mitigation and Monitoring Measures

- Temporary diversion route avoiding the L6309 local road will be in place along the Sligo Way Trail during the duration of the construction period. Please see Section 4.5.4 of Chapter 4 for further details.
- 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 5.10.2.2.5 below outlines the mitigation measures proposed in relation to traffic. Section 15.1.15 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 a short-term, imperceptible and not significant effect on tourism in the wider landscape during the construction phase the Proposed Project.

Significance of Effects

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

5.10.2.1.6 *Residential Amenity*

Pre-Mitigation Impact

Proposed Wind Farm

The potential for impacts on residential amenity is discussed in Section 5.8 above. There is the potential for impacts on residential amenity during the construction phase of the Proposed Wind Farm due to air, traffic, noise and vibration emissions due to the presence of additional traffic and plant machinery. Dust emissions will have a short-term slight negative impact. Noise and vibration emissions will have a short-term, negative impact. Traffic will have a temporary, slight, negative impact.

Proposed Grid Connection Route

There is potential for impacts on residential amenity due to the construction of the Proposed Grid Connection Route due to traffic and noise and vibration. The Proposed Grid Connection Route will be located within local roads, with a total length of 41.6km, this has the potential to give rise to traffic disruptions. Noise and vibration emissions will have a short-term, negative impact, which is not significant.

Mitigation and Monitoring Measures

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

Residual Effects

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

Significance of Effects

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

5.10.2.2 Health

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

5.10.2.2.1 *Health and Safety*

Pre-Mitigation Impacts

Proposed Wind Farm

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

Proposed Grid Connection Route

The construction of the Proposed Grid Connection Route will include working under existing overhead transmission lines near the existing 220kV Srananagh substation, which may impact on electrical infrastructure and supply in the area and along a local road which may give rise to traffic impacts. Furthermore, working in proximity to power lines and 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 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.
- The suitability of machinery and equipment for use near power lines will be risk assessed.
- All staff will be trained on operating voltages of overhead electricity lines running the Site. All staff will be trained to be aware of the risks associated with overhead lines. All contractors that may visit the Site are made aware of the location of lines before they come on to Site.
- Barriers will run parallel to the overhead line at a minimum horizontal distance of 6 metres on plan from the nearest overhead line conductor wire.
- When activities must be carried out beneath overhead lines, e.g., component delivery or substation construction, a Site-specific risk assessment will be undertaken prior to any works. The risk assessment must take into account the maximum potential height that can be reached by the plant or equipment that will be used prior to any works.

Overhead line proximity detection equipment will be fitted to machinery when such works are required.

- Information on safe clearances will be provided to all staff and visitors.
- Signage indicating locations and health and safety measures regarding overhead lines will be erected in canteens and on Site.
- All staff will be made aware of and adhere to the Health & Safety Authority's '*Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) (Amendment) Regulations 2021*'[56]. This will encompass the use of all necessary Personal Protective Equipment and adherence to the Site Health and Safety Plan.
- Temporary diversion routes avoiding the L6309 local road will be in place along the Sligo Way trail during the duration of the construction period.

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;
    - 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;

[56] *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

- 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.

5.10.2.2.2 *Noise and Vibration*

Pre-Mitigation Impacts

Proposed Wind Farm

There will be an increase in noise levels in the vicinity of the Proposed Wind Farm 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. 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 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 of the Proposed Project, depending on the activities underway and the distance from the main construction activities to the receiving properties. The potential noise impacts that will occur during the construction phase of the Proposed Wind Farm are further described in Chapter 12: Noise and Vibration. The predicted pre-mitigation noise impacts during the construction of the Proposed Wind Farm are assessed as negative, short-term and not significant.

Proposed Grid Connection Route

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 Route works. Please see Section 12.6.2 of Chapter 12 for further detail.

For the Proposed Grid Connection Route, the amount of required plant is relatively small. As such, construction activities in any one location will be limited in duration and adverse noise effects are anticipated to be negligible.

Where construction activities occur besides a NSR, the noise levels at that location are likely to be in the region of 75 – 80 dB(A) for a short period of time. It should be noted, however, that this would only occur where construction activities are directly opposite a NSR within approximately 20m and this would result in an instant noise level increase (i.e. not considering a full construction day). Trenching and backfill activities are anticipated to move along the Proposed Grid Connection Route at approximately 150m to 300m a day, therefore, the length of time when construction activities will be occurring adjacent to any given receptor is only likely to be for a few hours. For the majority of the time, plant and equipment will be located at greater distances and noise levels will be lower. It is possible that noise levels from trenching and backfill operations may occasionally exceed the BS 5228 threshold if within 20m of a dwelling, however this would only occur for a short period of time at any one location.

The predicted pre-mitigation noise impacts during the construction of the Proposed Grid Connection Route and associated infrastructure are assessed as negative, short term and not significant.

Mitigation and Monitoring Measures

Best practice measures for noise control will be adhered to on-site during the construction phase of the Proposed Project 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 12.7.1 of Chapter 12 using methods outlined in British Standard BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites – Noise.*
- The hours of construction activity will be limited to avoid unsociable hours where possible. Construction operations shall generally be restricted to between 7:00hrs and 19:00hrs Monday to Saturday. However, to ensure that optimal use is made of good weather periods or at critical periods within the programme (i.e. concrete pours, turbine component deliveries) it could occasionally be necessary to work out of these hours.

Residual Effects

With the implementation of the above mitigation measures, there will be a short-term, negative and not significant 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.

5.10.2.2.3 Air Quality: Dust and Exhaust Emissions

Pre-Mitigation Impacts

Proposed Wind Farm

Potential dust and exhaust emission sources during the construction phase of the Proposed Wind Farm include removal of Existing Wind Farm turbines, upgrading of existing access tracks and construction of new access tracks, turbine foundations, temporary construction compounds, onsite borrow pits, peat and spoil management areas, proposed enhancement and management and tree felling areas.

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

Proposed Grid Connection Route

Potential dust and exhaust emission sources during the construction phase of the Proposed Grid Connection Route include the laying of approximately 41.6km of underground electrical cabling and the road upgrade works which are associated with this process.

The exit via the L6309 to the north of the Proposed Wind Farm 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 impacts will have a short-term, slight, negative impact on air quality, which is not significant. The potential dust impacts may occur at construction phase of the Proposed Grid Connection Route are further described in Chapter 10: Air Quality.

Mitigation and Monitoring Measures

The majority of aggregate material for the construction of roads and turbine bases will be sourced from the onsite borrow pits, therefore limiting the distance needed to transport material to the Proposed Wind Farm. Truck wheels will be washed to remove mud and dirt before leaving the Proposed Wind Farm. All plant and materials vehicles shall be stored in the temporary construction compound areas 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 Grid Connection Rute will be small, ranging from 100-200m 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 imperceptible negative effect on air quality.

Significance of Effects

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

5.10.2.2.4 *Water Quality*

Pre-Mitigation Impacts

Proposed Wind Farm

The construction phase ground works and use of plant on Site may give rise to the potential release of suspended solids and hydrocarbons into surface and groundwaters. There are no underground water or sewerage networks at the Proposed Wind Farm infrastructure locations. There is a water treatment plant located within 1 kilometre of the Proposed Wind Farm, however the construction and operation of the Proposed Project will have no impact on the plant. There are no mapped groundwater source protection zones that overlap with the Site. Several private wells are located in the surrounding lands of the Proposed Wind Farm, however they have poor locational accuracies (>50m). Chapter 9: Hydrology and Hydrogeology assesses the potential for impact on group water schemes and other public water supplies during the construction phase. The pre-mitigation impact on water quality is assessed as negative, imperceptible, indirect, short term, unlikely effect on down gradient private water supplies.

Proposed Grid Connection Route

The Proposed Grid Connection Route underground cabling trench depth will only be approximately 1,315m in depth, the excavation will be temporary and transient, and the cable trench will be backfilled with hardcore material. There are 34 no. watercourse crossings (31 no. crossings over EPA mapped watercourses and 3 no. additional crossings over watercourses which are not included in the EPA database) along the Proposed Grid Connection Route. The potential sources of suspended sediment include runoff from spoil excavated from the Proposed Grid Connection infrastructure and entering surface or groundwater systems. The pre-mitigation effect on water quality is assessed as indirect, negative, slight, temporary, likely effect on downstream surface waters.

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 and will be subject to review, finalisation and updating (if required), 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 downstream water quality and aquatic habitats will be negative, imperceptible, indirect, temporary likely effect.

Significance of Effects

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

5.10.2.2.5 *Traffic and Transport*

Pre-Mitigation Impact

Proposed Wind Farm

All Existing Wind Farm turbine components removed from the Site will be taken to a suitable licenced recycling or material recovery facility.

It is proposed that large wind turbine components will be delivered from the Port of Killybegs and travel east on the N56 towards Donegal, further south along the N15 towards Sligo before continuing south on N4 through Ballysadare and subsequently merging onto the N59 heading west towards Dromore West. Delivery vehicles will then head south on the L2702 before turning east towards the site entrance in the townland of Crowagh or Dunneill Mountain, along the L6309 as detailed in Section 4.5.3 of Chapter 4. There are turbine delivery route accommodation works required to facilitate the delivery of components to the Proposed Wind Farm. Further details on turbine delivery route accommodation works are outlined in Section 4.5.3.1. of Chapter 4. In addition, deliveries of concrete for the construction of the proposed turbine foundations will also use the 5 no. proposed site entrances located off the L2702 and L6309 local roads, respectively to the west and northeast of the Proposed Wind Farm. The proposed site entrances are detailed in Table 4-6 of Chapter 4. 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 Site will also enter the Proposed Wind Farm at the proposed site entrances.

Materials to be used to construct the proposed onsite 110kV substation will be delivered to the Site via the L2702 and will enter from the west via the new proposed site entrance. 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.

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, slight, negative effect, and is Not Significant.

Proposed Grid Connection Route

Due to the nature of the Proposed Grid Connection Route, 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 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 underground cabling works will be completed with a traffic management plan in place and will follow the TII and ESBN requirements. The grid route trenches will be excavated in a rolling manner, approx. 100m to 200m per day and backfilled each evening.

By its nature the effects of the traffic volumes associated with the construction of the Proposed Grid Connection 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 TMP 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.

5.10.2.2.6 *Major Accidents and Natural Disasters*

Pre-Mitigation Impacts

Proposed Wind Farm

A risk register has been developed which contains all potentially relevant risks identified during the construction phase of the Site. Eight risks (Critical Infrastructure Emergencies, Severe Weather, Flooding, Utility Emergencies, Peat Stability, Traffic Incident, Contamination, and Fire/Gas Explosion) specific to the construction phase have been identified and are presented in Chapter 16: Major Accidents and Natural Disasters. As outlined in 16.4.1 of this EIAR, the scenario with the highest risk score in terms of the occurrence of major accident and/or disaster during the construction is identified as Fire/Explosion', 'Peat Stability', and 'Contamination'. In the absence of mitigation, the impact of Fire/ Explosion, Peat Stability and Contamination are unlikely, temporary, moderate, negative effects, which are Not Significant

Proposed Grid Connection Route

A risk register has been developed which contains all potentially relevant risks identified during the construction phase of the Proposed Grid Connection Route. Eight risks (Critical Infrastructure Emergencies, Severe Weather, Flooding, Utility Emergencies, Peat Stability, Traffic Incident, Contamination, and Fire/Gas Explosion) specific to the construction phase have been identified and are presented in Chapter 16: Major Accidents and Natural Disasters. The risk register concludes that there is low potential for natural disaster and/or major accident to occur along the Proposed Grid Connection Route. As outlined in Section 16.4.1.6 of this EIAR, the scenario with the highest risk score in terms of the occurrence of a major accident and/or disaster during construction is identified as Fire/Explosion', 'Peat Stability', and 'Contamination'. In the absence of mitigation, the impact of Fire/ Explosion, Peat Stability and Contamination are 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 '*Guide to Risk Assessment in Major Emergency Management'* (DoEHLG, 2010). It is considered that when the mitigation and monitoring measures outlined in the CEMP (Appendix 4-5) are implemented there the residual effects associated with the construction of the Proposed Project will be unlikely, temporary, slight, negative effects, which are Not Significant.

Significance of Effects

Based on the risk assessment in Chapter 16: Major Accidents and Natural Disasters, the effects to/ from major accidents and natural disasters during the construction phase of the Proposed Project is Not Significant.

5.10.2.2.7 Shadow Flicker

Shadow flicker, which occurs during certain weather conditions due to the movement of wind turbine rotor blades, as described in Section 5.2.3 and Section 5.9 above, can only occur during the operational phase of a wind energy development. There are therefore no shadow flicker impacts associated with the construction phase of the Proposed Project. Any shadow flicker effects that occur in the operational phase of the Proposed Turbines will be short-term in duration and is dealt with under Section 5.10.3.2.7 below.

5.10.3 Operational Phase

5.10.3.1 Population

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

5.10.3.1.1 Population Levels

Pre-Mitigation Impacts

Proposed Project

The operational phase of the Proposed Project (i.e., Proposed Wind Farm and Proposed Grid Connection Route) will have no impact on the population of the area with regard to changes to trends, population density, household size or age structure.

Mitigation and Monitoring Measures

No mitigation required.

Residual Effects

No residual effects.

Significance of Effects

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

5.10.3.1.2 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, 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 Sligo 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.

5.10.3.1.3 *Land Use Patterns and Activities*

Pre-Mitigation Impacts

Proposed Wind Farm

The footprint of the Proposed Wind Farm will occupy only a small percentage of the Site; 21ha (1.4%) of the overall 1,546-hectare site. In addition to the Existing Wind Farm, land-use on the Proposed Wind Farm primarily comprises peat bog, with coniferous forest to the north-west, east and south of the site. South of the Proposed Wind Farm comprises largely of transitional wood scrub, while land-use in the northern end of the site comprises largely of pastoral agriculture and low-density residential. The existing land-use practices of residential peat/turf cutting, commercial forestry will continue throughout the remainder of the Site in conjunction with the operational phase of the Proposed Project. The upgrades of existing roads and the addition of new access tracks throughout the Proposed Wind Farm will enable access for landowners throughout their lands. This will have a long-term, imperceptible, direct, positive impact on land use.

As detailed in Section 4.3.2.12.1 of Chapter 4, 29.3ha of conifer plantation will be replanted or replaced on a hectare for hectare basis as a condition of any felling licence that will be issued in respect of the Proposed Wind Farm. As outlined in the BMEP (Appendix 6-4), 0.5ha of marginal upland blanket bog (PB2) and 3.6ha of Cutover bog (PB4) will be lost to accommodate the Proposed Project. An area of approximately 41.45ha is proposed for habitat enhancement which is shown in Figure 2-1 of the BMEP. The main objective of the BMEP is to restore and manage the degraded peatland habitats present within the Site to a favourable conservation status for upland blanket bog. This will have a long-term, moderate, positive, impact on land use.

Proposed Grid Connection Route

The Proposed Grid Connection Route's footprint is limited to a small percentage of the Site. During the operational phase, traffic movements on the regional and local road network will resume as normal. The small scale of the 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 Grid Connection Route infrastructure will have no significant impact on other land-uses within the Site and the wider area. This will have a long-term not significant negative direct effect.

Mitigation and Monitoring Measures

No mitigation required.

Residual Effects

Due to the small footprint of the Proposed Project and the Proposed Grid Connection Route infrastructure on a site scale and even more so on a local scale, the residual effect is considered positive, moderate, direct, not significant, permanent effect on land use and activities during the operational phase.

Significance of Effects

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

5.10.3.1.4 Property Values

Pre-Mitigation Impacts

Proposed Wind Farm

As noted in Section 5.7.1 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 Wind Farm. The impact assessment on property values outlined below takes a precautionary approach and assumes that based on the inconclusive evidence summarised above in Section 5.7.1, 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 Wind Farm.

Proposed Grid Connection Route

As noted in Section 5.7.2 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 Route 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 Wind Farm 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

It can be concluded that there is the potential for a long-term, negative, imperceptible, 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.

5.10.3.1.5 *Tourism*

Pre-Mitigation Effect

Proposed Wind Farm

The Sligo Way is an identified tourist attraction pertaining to the Proposed Wind Farm. The varied natural landscape and scenic amenity of this area provide many opportunities for general outdoor recreation within the wider area. 7.2km of the trail passes through the Proposed Wind Farm, 3.3km via the L2702 local road, 1.6km along the L6309 local road and 2.3km within the Existing Wind Farm and local access tracks. Access along the Sligo Way trail will be maintained during the operational phase of the Proposed Project. There are no impacts determined to arise.

The next closest identified tourist attraction is Griddlestone, located in Tawnatruffaun, approximately 3.7km west from the nearest proposed turbine (T02).

Based on the literature review in Section 5.4.3 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.

Proposed Grid Connection Route

The Proposed Grid Connection Route passes under the Sligo Way for 2.3km along the L6309 local road. There are no impacts determined to arise during the operational phase. The Proposed Grid Connection Route will travel through the public road network and will be located underground. There are no other tourism attractions along the Proposed Grid Connection Route. The nearest tourist attraction is Pollnadivva Pier, approximately 1.9km north at its nearest point, located in Donaghintra, Co. Sligo. For all potential tourist attractions located along the Proposed Grid Connection Route, there will be no visibility of the Proposed Grid Connection Route during the operational phase and therefore no effects are deemed 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.

5.10.3.1.6 Residential Amenity

Pre-Mitigation Impact

Proposed Wind Farm

Potential impacts on residential amenity during the operational phase of the Proposed Wind Farm could arise primarily due to noise, shadow flicker or changes to visual amenity. This will have a long-term significant negative direct effect on residential amenity. Detailed noise and shadow flicker modelling have been carried out as part of this EIAR, which shows that the Proposed Wind Farm 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: Noise and Vibration of this EIAR. It should be noted that the Proposed Wind Farm 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 Wind Farm is addressed in Chapter 13: Landscape and Visual. The turbine locations have been designed to maximise turbine separation distances to dwellings in the area.

Potential impacts on residential amenity during the operational phase of the proposed onsite 110kV substation could arise primarily due to noise and changes to visual amenity. Detailed noise modelling has been carried for the proposed onsite 110kV substation, please see below and Chapter 12 for details. The visual effects of the 110kV onsite substation and the underground electrical cabling have been assessed in Chapter 13 of this EIAR also. The nearest sensitive receptor is located approximately 290m northwest of the proposed onsite 110kV substation location and will be further screened by existing conifer forestry.

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. Copies of scoping replies received are presented in Appendix 2-1 of the EIAR. The Proposed Wind Farm will have no impact on telecommunications.

Proposed Grid Connection Route

The Proposed Grid Connection Route is located underground; therefore, no residential amenity effects are deemed to arise from this element.

Mitigation and Monitoring Measures

- There are no turbines proposed within 720m (4 x tip height) of any sensitive receptors. As detailed above, the closest proposed turbine (T02) is 735m from the nearest sensitive receptor.
- 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 and construction materials haul route and the Proposed Grid Connection Route.

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

Residual Effects

The residual effect is considered to be a long-term, moderate, 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.

5.10.3.2 Health

5.10.3.2.1 *Health and Safety*

Pre-Mitigation Effect

Proposed Wind Farm

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 Wind Farm. This will have a potential long-term, slight negative impact on health and safety during the operational phase.

Proposed Grid Connection Route

Rigorous safety checks and continued maintenance are conducted along the 110kV underground cabling connection during operation to ensure the risks posed to staff and landowners are negligible. The high voltage cable within the public road corridor is the main risk posed to staff. This will have a potential long-term, slight impact on health and safety during the operational phase.

Mitigation and Monitoring Measures

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

- Access to the turbines is through a door at the base of the structure, which will be locked at all times outside maintenance visits. The doors will only be unlocked as required for entry by authorised personnel and will be locked again following their exit.
- Staff associated with the Proposed Project will conduct frequent visits, which will include inspections to establish whether any signs have been defaced, removed, faded, or are becoming hidden by vegetation or foliage, with prompt action taken as necessary.
- Signs will also be erected at suitable locations across the Site as required for the ease and safety of operation of the wind farm. These signs include:
  - Buried cable route markers at 50m (maximum) intervals and change of cable route direction;
  - Directions to relevant turbines at junctions;
  - “No access to Unauthorised Personnel” at appropriate locations;
  - Speed limits signs at Site entrance and junctions;
  - “Warning these Premises are alarmed” at appropriate locations;
  - “Danger HV” at appropriate locations;

    - "Warning – Keep clear of structures during electrical storms, high winds or ice conditions" at Site entrance;
    - "No unauthorised vehicles beyond this point" at specific Site entrances; and
    - Other operational signage required as per Site-specific hazards.
- The proposed onsite 110kV substation, which will be operated by ESB and Eirgrid, will be locked and fenced off from public access. The substation will be operational remotely and manually 24 hours per day, 7 days a week. Supervisory operational and monitoring activities will be carried out remotely using a SCADA system, with the aid of computers connected via a telephone modem link.
- Periodic service and maintenance work which include some vehicle movement.
- For operational and inspection purposes, substation access is required.
- Servicing of the substation equipment will be carried out in accordance with the manufacturer's specifications, which would be expected to entail the following:
    - Six-month service – three-week visit
    - Annual service – six-week visit
    - Weekly and daily visits as required.
- An operational phase Health and Safety Plan will be developed to fully address identified Health and Safety issues associated with the operation of the Site. Access for emergency services will be available at all times.

Residual Effects

With the implementation of the above mitigation measures, there will be a long-term, 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.

5.10.3.2.2 *Noise and Vibration*

Pre-Mitigation Effect

Proposed Wind Farm

A baseline assessment of the existing background noise conditions was carried out, the results of which are presented in Chapter 12 of the EIAR. An assessment of the operational wind turbine noise levels has also been undertaken, in accordance with best practice guidelines and procedures as outlined in Chapter 12: Noise and Vibration, through modelling of the development using noise prediction software. The Site-Specific Noise Limits were compared to the predictions of the Proposed Wind Farm operating on its own, and the results, based on the precautionary scenario of the loudest candidate turbine per wind speed across all scenarios, are summarised in Table 12-16 in Chapter 12 of this EIAR: Noise & Vibration. More details on the calculation of the Site-Specific Noise Limits and predictions for the other two candidate wind turbines are provided in Appendix 12-2.

The predicted noise levels at various wind speeds have been compared against the noise criteria curves outlined in Section 12.6.4.1 of Chapter 12 and are below the day and night-time criteria in all cases. Predicted noise levels are presented in Appendix 12-2.

The proposed onsite 110kV substation is located approximately 280m southeast from the closest noise sensitive location (NSL). This level of noise at this distance is considered negligible, and it is concluded that there will be no significant noise emissions from the operation of the proposed substation.

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

Proposed Grid Connection Route

Please note, the level of noise from the Proposed Grid Connection Route will be negligible and will only occur during maintenance or monitoring activities.

Mitigation and Monitoring Measures

Please see Chapter 12, Section 12.7 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 will be not significant. Please see Chapter 12: Noise and Vibration for details.

Significance of Effects

As stated in the noise assessment in Chapter 12, it has been demonstrated that the relevant national guidance in relation to noise associated with the Proposed Turbines, access tracks and the proposed onsite 110kV substation can be satisfied. The effects are considered not significant.

5.10.3.2.3 *Air Quality: Dust and Exhaust Emissions*

Pre-Mitigation Impact

Proposed Wind Farm

The Proposed Wind Farm will require daily visits of maintenance staff in LGVs and will produce dust and other emissions. Maintenance of the proposed onsite 110kV infrastructure may, on occasion, generate of small volumes of dust and exhaust emissions. The Proposed Wind Farm will generate electricity from a renewable source, contributing to a positive impact on air quality. Over the envisaged 35-year lifespan of the Proposed Wind Farm 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.

Proposed Grid Connection Route

The sources of dust and other emissions generated during the operational phase will be from infrequent visits by maintenance staff to the Proposed Grid Connection Route in LGVs. This will result in a long-term, slight, negative effect on air quality.

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 overall moderate positive effect on air quality.

Significance of Effects

Through the offsetting of dust and greenhouse gas emissions from fossil fuels, the Proposed Project is considered have no significant effects on air quality.

5.10.3.2.4 Water Quality

Pre-Mitigation Impact

Proposed Project

During the operational phase of the Proposed Project (Proposed Wind Farm and Proposed Grid Connection Route), 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 access tracks and hardstand areas. These works would be of a very minor scale and would be very infrequent. During such maintenance works there is a small risk associated with the release of hydrocarbons from Site vehicles, although it is not envisaged that any significant refuelling works will be undertaken on Site during the operational phase. Therefore, there will be a negative, slight, indirect, temporary, likely impact on human health due to a potential deterioration of water quality.

Mitigation and Monitoring Measures

- In advance of any planning application submission, SSE Renewables (Ireland) Ltd. is required to submit a diversion enquiry to Uisce Éireann and obtain a Confirmation of Feasibility (COF) letter from the Diversions Department.
- The mitigation measures detailed in Section 9.5.3 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.

5.10.3.2.5 Traffic and Transport

Pre-Mitigation Effect

Proposed Wind Farm

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

Proposed Grid Connection Route

Visits to the on-site substation by ESB and Eirgrid and/or the Proposed Wind Farm operator for maintenance and inspection purposes will be done via LGVs with occasional visits for maintenance and monitoring.

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.

5.10.3.2.6 Major Accidents and Natural Disasters

Pre-Mitigation Impact

Proposed Wind Farm

A risk register has been developed which contains all potentially relevant risks identified during the operational phase of the Proposed Wind Farm. Eight risks (Critical Infrastructure Emergencies, Severe Weather, Flooding, Utility Emergencies, Peat Stability, Traffic Incident, Contamination, and Fire/Gas Explosion) 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'. Therefore, in the absence of mitigation, the impact of Fire/Explosion is an unlikely, temporary, moderate, negative effect, which is Not Significant

Proposed Grid Connection Route

A risk register has been developed which contains all potentially relevant risks identified during the operational phase of the Proposed Grid Connection Route. Eight risks (Critical Infrastructure Emergencies, Severe Weather, Flooding, Utility Emergencies, Peat Stability, Traffic Incident, Contamination, and Fire/Gas Explosion) specific to the operational phase have been identified and are presented in Chapter 16: Major Accidents and Natural Disasters. The risk register concludes that there is low potential for significant natural disasters to occur at the Proposed Grid Connection Route. 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'. Therefore, in the absence of mitigation, the impact of Fire/Explosion is a unlikely, temporary, moderate, negative effect, which is 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 operation of the Proposed Project.

Residual Effects

Based on the assessment contained in Chapter 16, it is concluded that the risk of a major accident and/or disaster during the operational phase of the Proposed Project is considered 'low' in accordance with the '*Guide to Risk Assessment in Major Emergency Management'* (DoEHLG, 2010). It is considered that when the mitigation and monitoring measures outlined in the CEMP (Appendix 4-5) are implemented and adhered to there the residual effects associated with the operation of Proposed Project will be unlikely, temporary, slight, negative effects, which are Not Significant.

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.

5.10.3.2.7 Shadow Flicker

Pre-Mitigation Effect

Proposed Wind Farm

As stated in Section 5.9, 40 no. properties have been modelled for the shadow flicker assessment. Assuming theoretical precautionary conditions (i.e., 100% sunshine on all days where the shadow of the turbines passes over a house, wind blowing in the correct direction, no screening present, etc.), it is predicted that 37 no. properties may experience daily shadow flicker occurrences in excess of the Guidelines (DoEHLG, 2006) threshold of 30 minutes per day as a result of the Proposed Wind Farm. As mentioned in Section 5.2.3.5 above, only 17 no. of the 37 no. properties that are predicted to experience effects in excess of the 30-minute shadow flicker threshold may require mitigation measures. The Guidelines (DoEHLG, 2006) total annual limit of 30 hours is predicted to be exceeded at 2 no. properties when the regional sunshine average of 24.4% is taken into account. Of these 2 no. properties, 1 no. is in derelict condition, therefore will not require mitigation measures. This would result in a potential long-term moderate negative impact on properties.

Proposed Grid Connection Route

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

Proposed Mitigation Measures

Where daily or annual shadow flicker exceedances are predicted at any of the 17 no. properties identified above, 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 at all of the potentially affected properties, the following measures will be employed.

Wind Turbine Control Measures

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 farm's turbine to be programmed and controlled using the wind farm's control system such as Supervisory Control and Data Acquisition (SCADA) or the NorthTech 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 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. 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, will be continuously monitored at the Proposed Wind Farm and the data fed into the wind farm's control system. The strength of direct sunlight will be measured by way of photocells, and if the sunlight is of sufficient strength to cast a shadow, the shadow flicker control mechanisms will come into effect. Wind speed and direction will be 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 will 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.

In order to ensure that the model and the wind farm's control 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 wind farms control system can be applied to switch off particular turbines at the relevant times and dates, Table 5-11 below lists the 17 no. properties, at which a shadow flicker mitigation strategy may be necessary to ensure the Guidelines (DoEHLG, 2006) 30-minute per day shadow flicker threshold is not exceeded. Please note, properties in derelict condition have not been included in the table as no mitigation measures are required for these properties. 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 Guidelines (DoEHLG, 2006) limit of 30 minutes. The SCADA control system would be utilised to control shadow. The mitigation strategy outlined in Table 5-11 below is based on the theoretical precautionary scenario. The details presented in Table 5-11 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 Guidelines (DoEHLG, 2006) limit of 30 minutes.

Table 5-11 Shadow Flicker Mitigation Strategy for Daily and Annual Shadow Flicker Exceedance – Turbine Numbers and Days

Property No.	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)*	Days of Year When Mitigation May be Required (Dates)	Post-mitigation Maximum Annual Shadow Flicker (hrs:min:sec)
2	165	T8, T9, T10, T11, T12	1-29, 34-67, 77-84, 264, 269-313, 318-365	01/01/2026 - 29/01/2026, 03/02/2026- 08/03/2026, 18/03/2026- 25/03/2026, 20/09/2026 - 26/09/2026, 06/10/2026 - 09/11/2026, 14/11/2026 - 31/12/2026	00:30:00
4	87	T7, T8, T10	1-16, 41-58, 289-306, 331-365	01/01/2026-16/01/2026, 10/02-2026- 27/02/2026, 16/10/2026-02/11/2026, 27/11/2026-31/12/2026	00:30:00
5	68	T6, T7	21-47, 84-90, 256-262, 300-326	21/01/2026-16/02/2026, 25/03/2026-31/03/2026, 13/09/2026-19/09/2026, 27/10/2026 - 22/11/2026	00:30:00
6	75	T12, T13	1-28, 319-365	01/01/2026 - 28/01/2026, 15/11/2026-31/12/2026	00:30:00
7	50	T7	17-41, 306-330	17/01/2026 - 10/02/2026, 02/11/2026 - 26/11/2026	00:30:00
8	99	T12, T13	1-40, 307-365	01/01/2026 - 09/02/2026 - 03/11/2026 - 31/12/2026	00:30:00
9	91	T12, T13	1-36, 311-365	01/01/2026 - 05/02/2026, 07/11/2026 - 31/12/2026	00:30:00
10	61	T12, T13	20-46, 301-327, 352, 355-357, 360, 361, 363	20/01/2026 - 15/02/2026, 28/10/2026 - 23/11/2026, 18/12/2026, 21/12/2026 - 23/12/2026, 26/12/2026 - 27/12/2026, 29/12/2026	00:30:00
11	48	T7, T8	1-14, 332-365	01/01/2026- 14/01/2026, 28/11/2026 - 31/12/2026	00:30:00
12	139	T8, T9, T10, T11, T12	1-19, 22-54, 68-75, 272-279, 293-325, 328-365	01/01/2026 - 19/01/2026, 22/01/2026 - 23/02/2026, 09/03/2026 - 16/03/2026, 29/09/2026 - 06/10/2026, 20/10/2026 - 21/11/2026, 24/11/2026 - 31/12/2026	00:30:00
13	82	T10, T11, T12, T13	1-5, 16-29, 57-69, 277-289, 318-331, 342-348, 350-365	01/01/2026 - 05/01/2026, 16/01/2026 - 29/01/2026, 26/02/2026 - 10/03/2026, 04/10/2026 - 16/10/2026, 14/11/2026 - 27/11/2026, 08/12/2026 - 14/12/2026, 16/12/2026 - 31/12/2026	00:30:00
15	36	T6	25-42, 305-322	25/01/2026 - 11/02/2026, 01/11/2026 - 18/11/2026	00:30:00

Property No.	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)*	Days of Year When Mitigation May be Required (Dates)	Post-mitigation Maximum Annual Shadow Flicker (hrs:min:sec)
17	107	T8, T10, T11	1-34, 36-45, 302-311, 313-365	01/01/2026 - 03/02/2026, 05/02/2026 - 14/02/2026, 29/10/2026 - 07/11/2026, 09/11/2026 - 31/12/2026	00:30:00
19	49	T13	1-15, 332-365	01/01/2026 - 15/01/2026, 28/11/2026 - 31/12/2026	00:30:00
21	89	T8, T10, T11	1-35, 312-365	01/01/2026 - 04/02/2026, 08/11/2026 - 31/12/2026	00:30:00
22	39	T13	1-10, 337-365	01/01/2026 - 10/01/2026, 03/12/2026 - 31/12/2026	00:30:00
24	71	T8, T11	1-22, 24-27, 320-323, 325-365	01/01/2026 - 22/01/2026, 24/01/2026 - 27/01/2026, 16/11/2026 - 19/11/2026, 21/11/2026 - 31/12/2026	00:30:00

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.

Table 5-12 below displays the 1-no. property which is predicted to receive in excess of the Annual Shadow Flicker Limit of 30 hours per year. This 1 no. property is also included in the mitigation strategy set out in Table 5-11 above. There is also 1 no. other property predicted to receive in excess of the Annual Shadow Flicker Limit of 30 hours per year, however this property is in derelict condition and therefore no mitigation is required.

Table 5-12 Shadow Flicker Mitigation Strategy for Annual Shadow Flicker Exceedance

Property No.	Max. Annual Shadow Flicker Adjusted for Regional Sunshine (hrs:min:sec)	Turbine(s) Producing Shadow Flicker Exceedance	Post-mitigation Maximum Daily Shadow Flicker (hrs:mins:sec)
2	36:09:41	T8, T9, T10, T11, T12	≤30:00:00

Overall, the details presented in Table 5-12 demonstrate that using the turbine control system, it will be possible to reduce the level of shadow flicker at any affected property to below the daily Guidelines (DoEHLG, 2006) limit of 30 minutes, by programming the relevant turbines to switch off at the required dates and times.

Notwithstanding this, should shadow flicker associated with the Proposed Wind Farm be perceived to occur 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, 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. 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 could be brought in line with the requirements of the Draft Guidelines (DoHPLG, 2019) should they be adopted during the planning application process for this development.

Residual Effect

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

Based on the above, there will be a long-term imperceptible negative impact on human health from shadow flicker.

Significance of Effects

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

5.10.3.3 Interference with Communications Systems and EMF

Pre-Mitigation Impact

Proposed Wind Farm

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 5.6.3 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.

Proposed Grid Connection Route

EMF along the Proposed Grid Connection Route 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 Route and onsite substation present on the Site constitutes 110kV infrastructure, and so the EMF from this kV infrastructure will be of similar 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 Section 15.2 (Telecommunications and Aviation) of Chapter 15: Material Assets. Copies of the scoping responses received are presented in Appendix 2-1 of the EIAR. 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.

Mitigation Measures

Following the scoping and consultation exercise undertaken by MKO, further consultation with required telecommunication providers was held by Ai Bridges. While no mitigation measures are required to prevent significant effects, it is standard practice of 2RN to produce a protocol document for wind farm developments, which will be signed by the developer prior to construction. Further details can be found detailed within Chapter 15 Section 15.2.5 and in Appendix 15-7 Telecommunications Impact Assessment.

Residual Effects

Following the implementation of the mitigation measures above, there will be no residual effect from the Proposed Project on communication systems.

Significance of Effects

The effect on communications and effect on human health from EMF due to the operation of the Proposed Project is Not Significant.

5.10.3.4 Renewable Energy Production and Reduction in Greenhouse Gas Emissions

As detailed in Section 11.2.2 of Chapter 11: Climate, the EPA reported a provisional total of national greenhouse gas emissions for 2024 (excluding LULUF) to be 53.8 million tonnes carbon dioxide equivalent ($MtCO_2eq$); with greenhouse gas emissions from overall electricity generation in Ireland decreasing by 8.9% while electricity demand increased by 4.2% due to increased renewable electricity generation increasing 1.3%%.[57] The increase in renewables, combined with decreases in coal, oil, and peat use, resulted in the emissions intensity of power generation in Ireland in 2022 decreasing by 11.0%; i.e., an historic low of $226gCO_2/kWh$ in 2024 as compared with $254gCO_2/kWh$ in 2023. In 2024 the energy industry, transport and agriculture sectors accounted for 74.1% of total greenhouse gas emissions. Agriculture was the single largest contributor to overall emissions, being responsible for 38% of emissions. Transport and the energy industry accounted for 27.7% and 13.3% of total Irish emissions respectively. The EPA report highlights that whilst emissions are beginning to reduce, transformative measures will be needed to meet National Climate ambitions.

Ireland will therefore have to meet even more demanding climate change and renewable energy supply obligations in order to play its part in achieving the European climate and energy ambitions. As announced in April 2025, the Irish Government have pledged to generate 80% of the country's electricity supply from renewable sources by 2030.[58] 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 long-term moderate positive residual effect. The carbon loss and savings due to the Proposed Project are discussed in Section 11.4.3.2 of Chapter 11 of this EIAR.

5.10.4 Decommissioning Phase

The wind turbines proposed as part of the Proposed Project are expected to have a lifespan of approximately 35 years. Following the end of their useful life, the wind turbines may be replaced with a new set of turbines, subject to planning permission being obtained, or the Proposed Turbines may be decommissioned fully. The Proposed Grid Connection Route and on-site substation will remain in place as it will form part of the Electricity Grid under the ownership and control of the ESB and Eirgrid.

The works required during the decommissioning phase are described in Section 4.10 in Chapter 4: Description of the Proposed Project. 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 the mitigation measures outlined above will be implemented during the decommissioning phase also. A Decommissioning Plan has been prepared as part of this EIAR and is included as Appendix 4-6. This Decommissioning Plan follows the most up to date NatureScot guidance. By its nature, the Decommissioning Plan is a working document and, in accordance with the NatureScot guidance, an updated decommissioning plan will be agreed with the local authorities three

[57] *Ireland's Provisional Greenhouse Gas Emissions 1990-2024 (July 2025). Available at: https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/EPA-Provisional-1990-2024-GHG-Report-1716.pdf*
[58] *Department of the Environment, Climate and Communications (2025) Climate Action Plan 2025 <https://assets.gov.ie/static/documents/Climate_Action_Plan_2025_updated_cover.pdf>*

months prior to decommissioning the Proposed Project. The principles that will inform the final decommissioning plan are contained in the CEMP in Appendix 4-5.

5.10.5 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 potential cumulative effects of the Proposed Wind Farm, Proposed Grid Connection Route (together forming the Proposed Project) and other relevant developments has been carried out with the purpose of identifying what influence the Proposed Project will have on the surrounding environment when considered cumulatively. Further information on projects considered as part of the cumulative assessment are given in Section 2.9 of Chapter 2: Background to the Proposed Project. It should be noted that it is extremely unlikely event that all permitted and proposed projects as described in the cumulative assessment in Chapter 2 will be constructed at the same time, however for the purposes of this assessment these are considered in conjunction under a theoretical precautionary scenario. The impacts with the potential to have cumulative impacts on population and human health, in particular noise, air quality, climate, shadow flicker, traffic, telecommunications, and visual impacts are addressed in their relevant chapters of this EIAR.

5.10.5.1 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.

The commercial forestry activities on the Site provides between 3-6 months of employment, either for harvesting or replanting per year. These activities can continue while the proposed wind farm is under construction and operating, resulting in a long-term moderate positive cumulative impact.

5.10.5.2 Tourism and Amenity

The Sligo Way is an identified tourist attraction pertaining to the Proposed Wind Farm. The varied natural landscape and scenic amenity of this area provide many opportunities for general outdoor recreation within the wider area. 7.2km of the trail passes through the Proposed Wind Farm, 3.3km via the L2702 local road, 1.6km along the L6309 local road and 2.3km within the Existing Wind Farm and local access tracks. It is not considered that the Proposed Project together with other projects in the area will cumulatively affect any tourism infrastructure in the wider area. As mentioned previously, 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 5.4 above, the conclusions from available research indicate there is a generally positive disposition among tourists towards wind development in Ireland. It is on this basis that it can be concluded that there would be a long-term imperceptible cumulative effect from the Proposed Project and other wind farm developments in the area.

5.10.5.3 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. The nearest wind farm in the vicinity of the Proposed Turbines is the existing Black Lough Wind Farm which is approximately 4.2km west of the nearest Proposed Turbine (T03). The considerable distance will result in no potential for cumulative effects between the Proposed Project and the neighbouring developments. There are no other proposed or permitted wind farm developments within 5km of the Proposed Turbines.

The mitigation measures in relation to traffic set out in Section 5.10.2.2.5 above will ensure that any cumulative effects that arise will be short term in duration and imperceptible in significance.

5.10.5.4 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 developments within 20 kilometres of the Proposed Wind Farm that are yet to be constructed, there will be minor emissions from construction plant and machinery and potential dust emissions associated with the construction activities. However, once the mitigation proposals, as outlined in Section 10.3.2.1 to Section 10.3.4 of Chapter 10 are implemented during the construction phase of the Proposed Project, there will be no significant cumulative negative effect on air quality.

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

5.10.5.5 Health and Safety

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

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

5.10.5.6 Property Values

As noted in Section 5.10.3.1.4 above, it can be concluded that there is the potential for a short-term, negative, not significant effect on property values within 1km of the Proposed Turbines. There are no other cumulative turbines located within 2km of the Proposed Turbines and so this area within 1km, where there is potential for impacts on property values, will not overlap with any other cumulative turbines. On that basis it is concluded that there is no potential for cumulative effects on property values to arise.

5.10.5.7 Services

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

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

5.10.5.8 Shadow Flicker

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

5.10.5.9 Residential Amenity

Pre-Mitigation Impact

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

Proposed Mitigation Measures

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

Residual Effects

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

Significance of Effects

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

5.11 Summary

Chapter 8: Land, Soils and Geology, Chapter 9: Hydrology and Hydrogeology, Chapter 10: Air Quality, Chapter 11: Climate, Chapter 12: Noise and Vibration, Chapter 13: Landscape and Visual and Chapter 14: Cultural Heritage, and Chapter 15: Material Assets provide an assessment of the effects of the Proposed Project on these areas of consideration. Chapter 16: Major Accidents and Natural Disasters assesses the vulnerability of the Proposed Project to and from major accidents and natural disasters. There is potential for positive effects to populations as a result of employment and investment in the locality. There is the potential for negative effects on human health during the Proposed Project 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 assessments in the chapters listed show that the residual effects are not significant and will not lead to significant effects on any environmental media with the potential to lead to health effects for humans. On this basis, the potential for negative health effects associated with the Proposed Project is slight to imperceptible. Furthermore, the Proposed Wind Farm is capable of offsetting carbon emissions associated with the burning of fossil fuels. During the operational stage the Proposed Wind Farm will have a long term, moderate positive effect on air quality as set out in Chapter 10 which will contribute to positive effects on human health and assist in Ireland reaching its emissions targets and renewable energy goals.

5.12 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 5-13 Impact Assessment Classification Summary

Topic	Pre-Mitigation Effect	Mitigation Section Reference	Residual Effect	Significance
Construction Phase				
Population Levels	No identified impacts	Section 5.10.2.1.1 – No mitigation required	No identified impacts	Not Significant
Employment and Investment	Short-term, Moderate, Positive	Section 5.10.2.1.2	Short-term, Moderate, Positive	Not Significant
Land Use Patterns & Activities	Short-Term, Slight, Negative	Section 5.10.2.1.3 – No mitigation required	Short-Term, Slight, Negative	Not Significant
Property Values	Short-Term, Slight, Negative	Section 5.10.2.1.4	Short-Term, Imperceptible, Negative	Not Significant
Tourism	Short-Term, Slight, Negative	Section 5.10.2.1.5	Short-Term, Imperceptible, Negative	Not Significant
Residential Amenity	Short-Term, Slight, Negative	Section 5.10.2.1.6	Short-Term, Slight, Negative	Not Significant
Health & Safety	Short-term, Significant, Negative	Section 5.10.2.2.1	Short-Term, Slight, Negative	Not Significant
Noise and Vibration	Short-Term, Not Significant, Negative	Section 5.10.2.2.2	Short-Term, Not Significant, Negative	Not Significant
Air Quality: Dust and Exhaust Emissions	Short-Term, Slight, Negative	Section 5.10.2.2.3	Short-Term, Imperceptible, Negative	Not Significant
Water Quality	Short-Term, Slight, Negative	Section 5.10.2.2.4	Short-Term, Imperceptible, Negative	Not Significant
Traffic and Transport	Temporary, Slight, Negative	Section 5.10.2.2.5	Temporary, Slight, Negative	Not Significant
Major Accidents and Natural Disasters	Temporary, Moderate, Negative	Section 5.10.2.2.6	Temporary, Slight, Negative	Not Significant

Shadow Flicker	N/A	N/A	N/A	N/A
Operational Phase				
Population Levels	No identified impacts	Section 5.10.3.1.1 – No mitigation required	No identified impacts	Not Significant
Employment and Investment	Long-Term, Slight, Positive	Section 5.10.3.1.2 – No mitigation required	Long-Term, Slight, Positive	Not Significant
Land Use Patterns and Activities	Long-term, Moderate, Positive	Section 5.10.3.1.3 – No mitigation required	Permanent, Moderate, Positive	Not Significant
Property Values	Long-Term, Slight, Negative	Section 5.10.3.1.4	Long-Term, Imperceptible, Negative	Not Significant
Tourism	No identified impacts	Section 5.10.3.1.5 – No mitigation required	No identified impacts	Not Significant
Residential Amenity	Long -Term, Significant, Negative	Section 5.10.3.1.6	Long-Term, Moderate, Negative	Not Significant
Health and Safety	Long-term, Slight, Negative	Section 5.10.3.2.1	Long-Term, Imperceptible, Negative	Not Significant
Noise and Vibration	Long-Term, Not Significant, Negative	Section 5.10.3.2.2	Long-Term, Not Significant, Negative	Not Significant
Air Quality; Dust and Exhaust Emissions	Long-Term, Slight, Negative	Section 5.10.3.2.3	Long-Term, Moderate, Positive	Not Significant
Water Quality	Temporary, Slight, Negative	Section 5.10.3.2.4	Temporary, Imperceptible, Negative	Not Significant
Traffic and Transport	No identified impacts	Section 5.10.3.2.5 – No mitigation required	No identified impacts	Not Significant
Major Accidents and Natural Disasters	Temporary, Moderate, Negative	Section 5.8.3.2.7	Temporary, Slight, Negative	Not Significant

Shadow Flicker	Long-Term, Moderate, Negative	Section 5.10.3.2.7	Long-Term, Imperceptible, Negative	Not Significant
Interference with Communication Systems and EMF	No identified impacts	Section 5.10.3.3	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 5.10.2 will be implemented during the decommissioning phase also.	Section 5.10.2	N/A	N/A