



Chapter 05 Population and Human Health

Ballinlee Wind Farm

Ballinlee Green Energy Ltd.

September 2025

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5. Population and Human Health

5.1 Introduction

This Chapter considers any likely significant effects of the proposed development on population and human health. A full description of the proposed development, development lands and all associated development elements is provided in **Volume II, Chapter 02** Description of the Proposed Development of this EIAR. The Study Area for the purpose of the population and human health assessment focuses on any Electoral Divisions where there is an element of the proposed development and Grid Connection Route present. The human environment is examined in terms of population and settlement, economic activity, employment, land use, tourism, community facilities, human health and wellbeing, and residential amenities as outlined in the Guidelines on the information to be contained in Environmental Impact Assessment Reports published by the EPA in 2022. Included within the chapter is an assessment of the potential impact from shadow flicker, noise and climate change by the proposed development during the operational phase on human health. A full assessment of these topics are also carried out in **Volume II, Chapter 10** Air Quality, **Volume II, Chapter 13** Noise and Vibration, and **Volume II, Chapter 15** Shadow Flicker of this EIAR.

The chapter has been prepared having regard to information on the local population and land-use and in consideration of any human health impacts via environmental pathways from aspects such as soil, air, water or changes to material assets.

The assessment comprises:

- A description of the existing human environment;
- Prediction and characterisation of effects;
- Evaluation of effect significance; and
- Consideration of mitigation measures, where appropriate.

Information has been gathered from publicly available sources, including Local Authority Plans (for Limerick City and County Council), the Central Statistics Office (CSO), Fáilte Ireland and the Met Éireann website.

5.1.1 Competency of Assessor

This EIAR chapter has been prepared by William Murphy MSc., BA (Hons), HDip, an Environmental Consultant at MWP. William has 4 years' experience in environmental consulting, and in this time contributed to various EIAR chapters, including Population and Human Health. William has also been involved in the preparation of numerous Construction and Environmental Management Plans (CEMPs), Resource Waste Management Plans (RWMPs), which also take consideration of the effects on population and human health. This experience makes William an appropriately qualified, trained and competent professional, having experience gained through a variety of onshore wind, solar, marine, and large-scale strategic infrastructure development.

This assessment has been reviewed by Aileen O'Connor (MWP), BSc(Hons), PGDip, who has over 13 years' experience in the environmental field both in industry and consultancy work. Aileen is a Senior Environmental Consultant and holds a BSc(Hons) in Environmental Science and PGDip in Energy Management. Aileen is an experienced and competent environmental professional with a background in contaminated land assessment,

licence compliance and waste management. Aileen has prepared and peer reviewed chapters of EIARs and has coordinated and delivered many environmental assessment reports and consent applications for transmission and power generation projects including the preparation of Resource Waste Management Plans RWMPs and contributed to Material Assets Impact Assessments. More specifically, she has worked on a wide variety of projects during her career to date including wind farms, marine, quarries, industrial and commercial developments.

5.2 Scope of Assessment

The assessment considers the entirety of the proposed development, including the wind turbines, associated infrastructure, access tracks, grid connection and on-site substation.

The assessment has been prepared in accordance with the following legislation and published guidance:

- EU Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment as amended by Directive 2014/52/EU (the “EIA Directive”);
- Guidelines for Planning Authorities and An Bord Pleanála in carrying out Environmental Effect Assessment, Department of Housing, Planning and Local Government, August 2018;
- Planning Guidelines for Wind Energy, DEHLG 2006;
- Draft Revised Wind Energy Development Guidelines, DHPLG 2019;
- Investigation into the Assessment of Health Impacts within National Environmental Regulation Processes, EPA, 2015;
- EIA Guide to Effective Scoping of Human Health, IEMA 2022;
- EIA Guide to Determining Significance for Human Health, IEMA 2002;
- EPA Guidelines on the Information to be Contained in Environmental Impact Reports, EPA, May 2022; and
- European Commission Guidance on the preparation of the EIAR (2017), which influenced the production of the EPA Guidelines mentioned above.

Issues such as commercial competition, zoning, property prices, agri-business and other social and economic issues are dealt with by more specific instruments (such as the Planning Acts). **Table 5-1** outlines those issues which the EPA guidance suggests may be examined as part of this study.

Table 5-1: Issues Relevant to the Human Environment

Topic Area	Potential Issues
Economic Activity	Will the development stimulate additional development and/or reduce economic activity, and if either, what type, how much and where?
Social Consideration	Will the development change pattern and types of activity and land use?
Land-use	Will there be severance, loss of rights of way or amenities, conflicts, or other changes likely to ultimately alter the character and use of the surroundings?
Tourism	Will the development affect the tourism profile of the area?
Health Human and Wellbeing	Vectors through which human health impacts could be caused e.g., will there be risks of death, disease, discomfort or disturbance, such as noise or shadow flicker?

Note: Shadow flicker is defined as the alternating light intensity produced by a wind turbine as the rotating blade casts shadows on the ground and stationary objects, such as the window of a residence. Shadow flicker can only occur if there is an unobstructed direct line of sight from within a dwelling to a turbine. No flicker will occur when the turbine is not rotating or when the sun is obscured by clouds or fog or if blinds or curtains are drawn at the receptor location.

5.2.1 Methodology

The methodology used for this study included desk-based research of published information and site visits to assemble information on the local receiving environment in line with the legislation and guidance referred to in **Section 5.2**.

5.2.1.1 Desk Study

A desk study was undertaken to identify potential impacts, either positive or adverse, on the human environment that could cause change in the 'quality of life' as a consequence of construction, operation, and decommissioning of the proposed development.

The local human environment is made up of a number of groups. These include those who reside in, work in, visit, or use the local road networks in the area. The local residential population is deemed to be the most sensitive group in terms of those most likely to experience any identified impacts.

The desk study included the following activities:

- Review of the most recent Central Statistics Office (CSO) Census of Ireland data (2022) to establish settlement demographics and economic context of the study area;
- Review of the Agricultural Census and Forestry data for Ireland;
- Review of Ordnance Survey Mapping and aerial photography to establish existing land use and settlement patterns within the study area;
- Review of local and regional development plans and planning policy in order to identify future development and identify any planning allocations within the study area;
- Review of Limerick City and County Council's and An Coimisiún Pleanála's (ACP) Planning Register to identify relevant development proposals currently under consideration by the Council and Commission;
- Review of planning policy and strategies to identify, way-marked walking and cycling routes and other 'Rights of Ways' within the study area;

- Review of tourism data including Tourism Ireland, Fáilte Ireland, and local websites to identify tourism data and visitor attractions within the study area; and
- Review of An Exploration of the Recreation and Amenity Potential of the Mague Rivers: Baseline Report for Potential Opportunities.

Based on a review of the characteristics of the proposed development, any potential adverse impacts on the local human environment are considered to include the following human health/wellbeing and disturbance concerns:

- Dust emissions from construction activities;
- Noise emissions during the construction and operation;
- Public safety during construction activities and operations;
- Traffic disturbance during construction and operation, and;
- Visual impacts and shadow flicker operation.

Each of these concerns have been fully addressed and documents in various chapters of this EIAR as set out in **Table 5-2**. These assessments were reviewed to inform this study. According to the EPA guidance, neighbouring residents and land users are considered potentially vulnerable receptors (i.e. an entity that is vulnerable to the adverse effect of hazardous substance (e.g. human health)). In the case of this proposed development, potential vulnerable receptors are those who may be affected by air emissions, water emissions, traffic and noise during the construction phase. They may also be affected visually. Receptors which are community facilities such as schools, churches, hospitals or provide other social services are also considered potentially vulnerable receptors.

Table 5-2: Potential Disturbance & Health and Safety Issues and Relevant EIAR Chapters

Potential Disturbance / Health & Safety Issue	EIAR Chapter
Dust emissions from construction/decommissioning activities	Chapter 10 Air Quality
Noise emissions during construction/decommissioning and operation	Chapter 13 Noise and Vibration
Public safety during construction/decommissioning activities and operation	Chapter 2 Description of the Proposed Development
Traffic disturbance during construction/decommissioning and operation	Chapter 16 Material Assets – Traffic and Transportation
Visual impacts during operation	Chapter 12 Landscape and Visual
Shadow flicker during operation	Chapter 15 Shadow Flicker

The following potential positive impacts were also identified during the review:

- Positive effect of local renewable energy, displacing 2.5 million tons of CO₂ over the 35-year lifetime of the proposed development;
- Positive effect on local and national targets in relation to renewable energy generation;
- Positive effect on air quality due to the displacement of fossil fuel generated electricity;
- Positive effect of creating local construction jobs for the duration of 24-months;
- Positive effect of significant commercial rates being paid over the 35-year lifetime of the proposed development to the local authority that will be utilised to fund services within the county;
- Positive effect of planning contribution fees that the local authority will utilise to fund services within the county, and;

- Positive effect of the community benefit fund c. €350,000/year over the first 15 years of operation.

5.2.1.2 Site Visits

Site visits were conducted in 2022, 2023, and 2024 to ascertain land uses in the study area and to identify the location and spatial distribution of residential dwellings.

5.2.1.3 Consultation

Ballinlee Green Energy Ltd. has undertaken a consultation process with the local community. In line with national policy, Ballinlee Green Energy Ltd. is committed to transparent and meaningful consultation. This facilitates more informed and active engagement with the proposed development. A dedicated website has also been set up to allow those with queries to easily access information about the project, and contact should they have any questions, <https://ballinleegreenenergy.ie>. Activities of public engagement carried out to this stage of the proposed development are detailed in **Volume II, Chapter 01** Introduction of this EIAR, and the Community Consultation Report found in **Volume III, Appendix 1C** of this EIAR.

5.2.1.4 Assessment Criteria

Determination of the significance of an effect will be made, where practicable, in accordance with the terminology outlined in Table 3.4 of the 2022 EPA *Guidelines on the Information to be contained in Environmental Impact Reports*, as shown in **Table 5-3**.

Table 5-3: EPA Guidelines Description of Effects

	Term	Description
Quality of Effects	Positive	A change which improves the quality of the environment
	Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error
	Adverse	A change which reduces the quality of the environment
Significance of Effects	Imperceptible	An effect capable of measurement but without significant consequence
	Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences
	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
	Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends
	Significant	An effect which, by its character, magnitude duration or intensity alters a sensitive aspect of the environment
	Very Significant	An effect which, by its character, magnitude duration or intensity alters most of a sensitive aspect of the environment
	Profound	An impact which obliterates sensitive characteristics
Duration of Effect	Momentary	Effects lasting from seconds to minutes
	Brief	Effects lasting less than a day
	Temporary	Effects lasting less than a year
	Short-term	Effects lasting one to seven years
	Medium-term	Effects lasting seven to fifteen years

	Term	Description
	Long-term	Effects lasting fifteen to sixty years
	Permanent	Effects lasting over sixty years
	Reversible	Effects than can be undone e.g. through remediation or restoration
	Frequency	How often the effect will occur (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)
Types of Effects	Indirect	Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
	Cumulative	The addition of many minor or significant effects, including effects of other projects, to create a larger, more significant effect.
	‘Do Nothing’	The environment as it would be in the future should the subject project not be carried out.
	‘Worst case’	The effects arising from a project in the case where mitigation measures substantially fail.
	Indeterminable	When the full consequences of a change in the environment cannot be described.
	Irreversible	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
	Residual	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
	Synergistic	Where the resultant effect is of greater significance than the sum of its constituents, (e.g. combination of SO _x and NO _x to produce smog).

Current assessment criteria for Shadow Flicker are described in the Department of the Environment, Heritage and Local Government, Wind Energy Development Guidelines, 2006. These guidelines are currently under review and replacement Draft Wind Energy Development Guidelines were published in December 2019.

Until the revised guidelines are published in final form, the current 2006 guidelines remain in force. However, with mitigation measures proposed for shadow flicker employed in full, the criteria in both documents will be achieved for the proposed development.

The 2006 Guidelines recommend that shadow flicker at offices and dwellings within 500m of a turbine should not exceed 30 hours per year or 30 minutes per day, and at distances greater than 10 rotor diameters from a turbine, the potential for shadow flicker is very low.

The shadow flicker criteria described in the 2019 Draft Wind Energy Guidelines are as follows:

‘The planning authority or An Bord Pleanála should impose condition(s) 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 potential for unmitigated shadow flicker occurrence within a defined 10 rotor diameter study area was modelled. The results for a theoretical worst-case and more realistic scenario are presented, discussed, and compared against the guideline shadow flicker criteria in the existing 2006 Wind Energy Development Guidelines and the 2019 Draft Revised Wind Energy Development Guidelines (WEDG).

Further details in relation to Shadow Flicker methodology is addressed in **Volume II, Chapter 15** Shadow Flicker of this EIAR.

The Ambient Air Quality and Cleaner Air for Europe (CAFE) Directive (2008/50/EC) was published in May 2008 and was originally transposed into Irish legislation by the Air Quality Standards Regulations in 2011 (S.I. No. 180 of 2011). Since the transposition, Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011) has been replaced and revoked by S.I. No. 739/2022 - Ambient Air Quality Standards Regulations 2022.

The EPA manages the ambient air quality monitoring network. In order to protect health, vegetation and ecosystems, EU directives set down air quality standards in Ireland and the other member states for a wide variety of pollutants. These rules include how to monitor, assess and manage ambient air quality.

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values, as shown in **Table 5-4**. Further details in relation to Air Quality and Dust methodology is addressed in **Volume II, Chapter 10** of this EIAR.

Table 5-4: Ambient Air Quality Standards

Pollutant	Regulation ¹	Limit Type	Limit Value ²
Nitrogen Dioxide (NO ₂)	S.I. 180 of 2011	Hourly limit for protection of human health – not to be exceeded more than 18 times per year	200 µg/m ³
		Annual limit for protection of human health	40 µg/m ³
Nitrogen Oxides (NO + NO ₂)	S.I. 180 of 2011	Critical limit for the protection of vegetation and natural ecosystems	30 µg/m ³
Lead	S.I. 180 of 2011	Annual limit for protection of human health	0.5 µg/m ³
SO ₂	S.I. 180 of 2011	Hourly limit for protection of human health - not to be exceeded more than 24 times per year	350 µg/m ³
		Daily limit of protection of human health – not to be exceeded more than three times per year	125 µg/m ³
		Critical limit for the protection of vegetation and natural ecosystems (calendar year and winter)	20 µg/m ³
Particulate Matter PM ₁₀	S.I. 180 of 2011	24 hour limit for protection of human health – not to be exceeded more than 35 times per year	50 µg/m ³
		Annual limit for protection of human health	40 µg/m ³
Particulate Matter PM _{2.5} -	S.I. 180 of 2011	Annual limit for protection of human health	25 µg/m ³
Benzene	S.I. 180 of 2011	Annual limit for protection of human health	5 µg/m ³
Carbon Monoxide (CO)	S.I. 180 of 2011	8-hour limit (on a rolling basis) for protection of human health	10 mg/m ³

¹ CAFE Directive replaces the previous Council Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management and daughter directives, Council Directive 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air and Directive 2000/69/EC of the European Parliament and of the Council of 16 November 2000 relating to limit values for benzene and carbon monoxide in ambient air

² µg/m³ (micrograms per cubic metre); mg/m³ (milligrams per cubic metre)

There is no statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a Development. Local authorities normally control construction activities by imposing limits on the hours of construction works and may consider noise limits at their discretion.

BS 5228-1:2009+A1:2014

In the absence of specific noise limits which may be set by the Local Authority, appropriate construction limits given in *BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise* have been adopted in this assessment. This standard provides information on the prediction and measurements of noise from construction sites and operations such as mines and quarries. It also includes a large database of source noise levels for commonly used equipment and activities on construction sites.

The standard provides guidance on the 'threshold of significant effect' in respect to noise impacts at dwellings. The proposed 'ABC method' derives appropriate construction noise limits from existing ambient noise levels and the relevant categories are provided in **Table 5-5**.

In general, the noise impact due to the construction phase will be from the specific items of plant used, the duration and phasing of the construction methods, the time of day that each plant will be used and their location.

During operation, the operational noise limits set out in WEDG-06 are as follows:

- 35 to 40 dB for quiet daytime environments of less than 30dB at a given wind speed range;
- 45dB for daytime environments greater than 30dB or a maximum increase of 5dB above background noise (whichever is the higher); and
- 43dB for night-time periods or a maximum increase of 5dB above background noise (whichever is the higher).

It should be noted that while the caveat of an increase of 5dB above background for the night-time period is not explicit within the current guidance it is commonly applied in noise assessments prepared and is detailed in numerous examples of planning conditions issued by local authorities and An Coimisiún Pleanála.

Table 5-5: BS5228 Categorisation Table

Assessment Category and Threshold Value Period.	Threshold values in Decibel Level (dB $L_{Aeq,1hr}$)		
	Category A ^{A)}	Category B ^{B)}	Category C ^{C)}
Night-time (23.00–07.00)	45	50	55
Evenings and weekends ^{D)}	55	60	65
Daytime (07.00–19.00) and Saturdays (07.00–13.00)	65	70	75
NOTE 1 A significant effect has been deemed to occur if the total L_{Aeq} noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level.			
NOTE 2 If the ambient noise level exceeds the threshold values given in the table (i.e., the ambient noise level is higher than the above values), then a significant effect is deemed to occur if the total L_{Aeq} noise level for the period increases by more than 3 dB due to construction activity.			
NOTE 3 Applied to residential receptors only.			
^{A)} Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.			
^{B)} Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.			

Assessment Category and Threshold Value Period.	Threshold values in Decibel Level (dB L _{Aeq,1hr})
C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.	
D) 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.	
Periods may be amended to suit local conditions	

5.3 Existing Environment

5.3.1 Study Area

The Study Area for the purpose of this assessment on Population and Human Health focuses on the local receiving human environment in the vicinity of the proposed development. In the case of Ballinlee Wind Farm, this includes the Electoral Divisions (EDs), listed in **Section 5.3.4**, that interact with the proposed development, and comprises of those who reside, work, visit, or use the local road networks that the proposed development interacts with.

Although this chapter predominantly describes the human environment in the vicinity of the proposed development, sensitive human receptors in the broader human environment are considered in the other specialised environmental topics, including the following;

- Air Quality (**Volume II, Chapter 10** of this EIAR);
- Climate (**Volume II, Chapter 11** of this EIAR);
- Landscape and Visual (**Volume II, Chapter 12** of this EIAR);
- Noise and Vibration (**Volume II, Chapter 13** of this EIAR);
- Cultural Heritage (**Volume II, Chapter 14** of this EIAR);
- Shadow Flicker (**Volume II, Chapter 15** of this EIAR);
- Material Assets – Traffic and Transportation (**Volume II, Chapter 16** of this EIAR); and
- Material Assets – Built Services (**Volume II, Chapter 17** of this EIAR)

5.3.2 Site Description and Location

The area of the proposed development boundary is approximately 255.12 hectares (ha). The proposed development is located in a rural area of east Limerick, approximately 18km south of Limerick City, and 3km southwest of Bruff. **Figure 5-1** outlines the location of the proposed development and indicates the planning application boundary. The proposed development is located on privately-owned predominantly agricultural lands within the townlands of Ballincurra, Ballinlee South, Ballingayrou, Ballinrea, Knockuregare, Ballinlee North, Carrigeen and Camas South (**Figure 5-2**). The site is situated in a rural area characterised by agricultural holdings and one-off residential dwellings. Some patches of forestry plantation occur within the proposed project and some on neighbouring properties.

The grid route is approximately 27.6km and is located along road networks within the townlands of Milltown, Ballysimon Commons, Coolyhenan, Knockananty, Ballybrennan, Drombanny, Carrigmartin, Cahernarry (Cripps), Scart, Ballyogartha, Ballyneety, Knockbrien, Glen, Ballymacreese, Ballynagarde, Stonepark, Carriganattin, Rochestown, Friarstown, Rockstown, Skool, Friarstown South, Grange, Ballynagallagh, Rockbarton, Cahirguillamore, Ballynanty, Ballybane, Ballyreesode and Camas North.

To facilitate the turbine delivery a new temporary access track is proposed on privately-owned predominantly agricultural lands within the townland of Tullovin approximately 3.3km southeast of Croom, Co. Limerick.

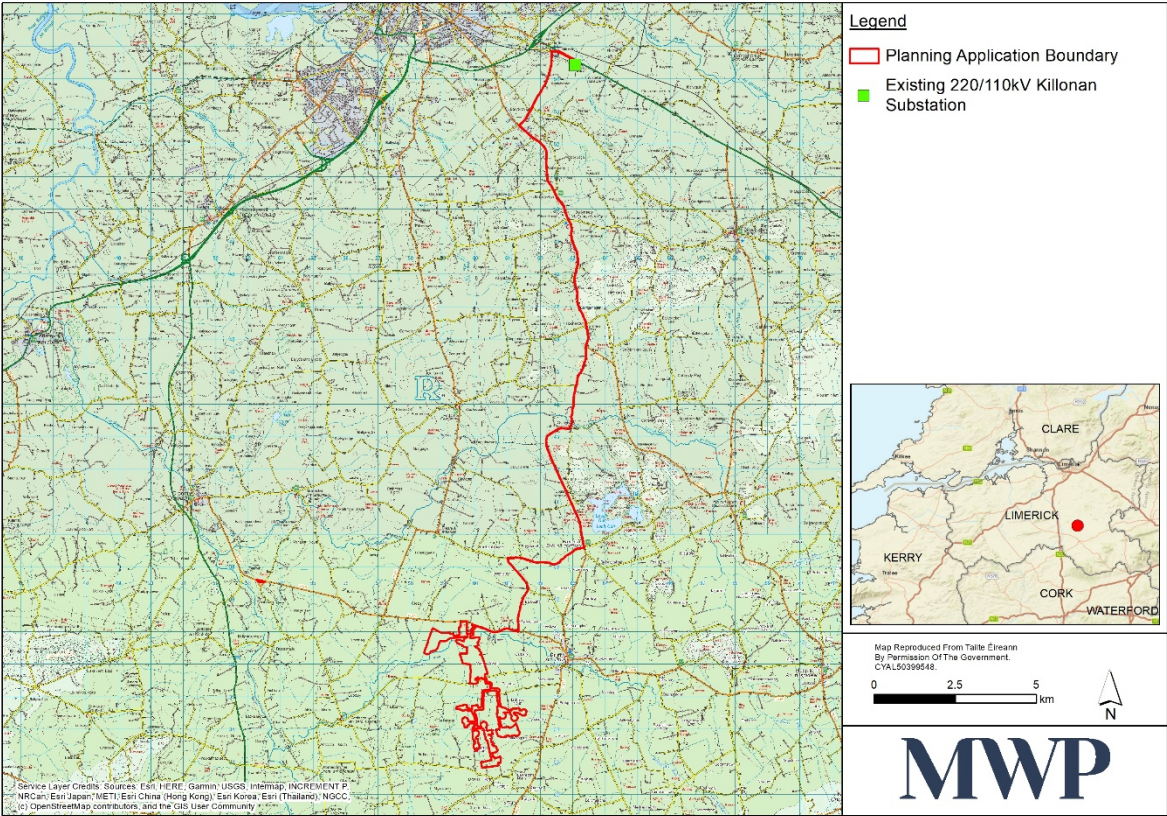


Figure 5-1: Location of the Proposed Development

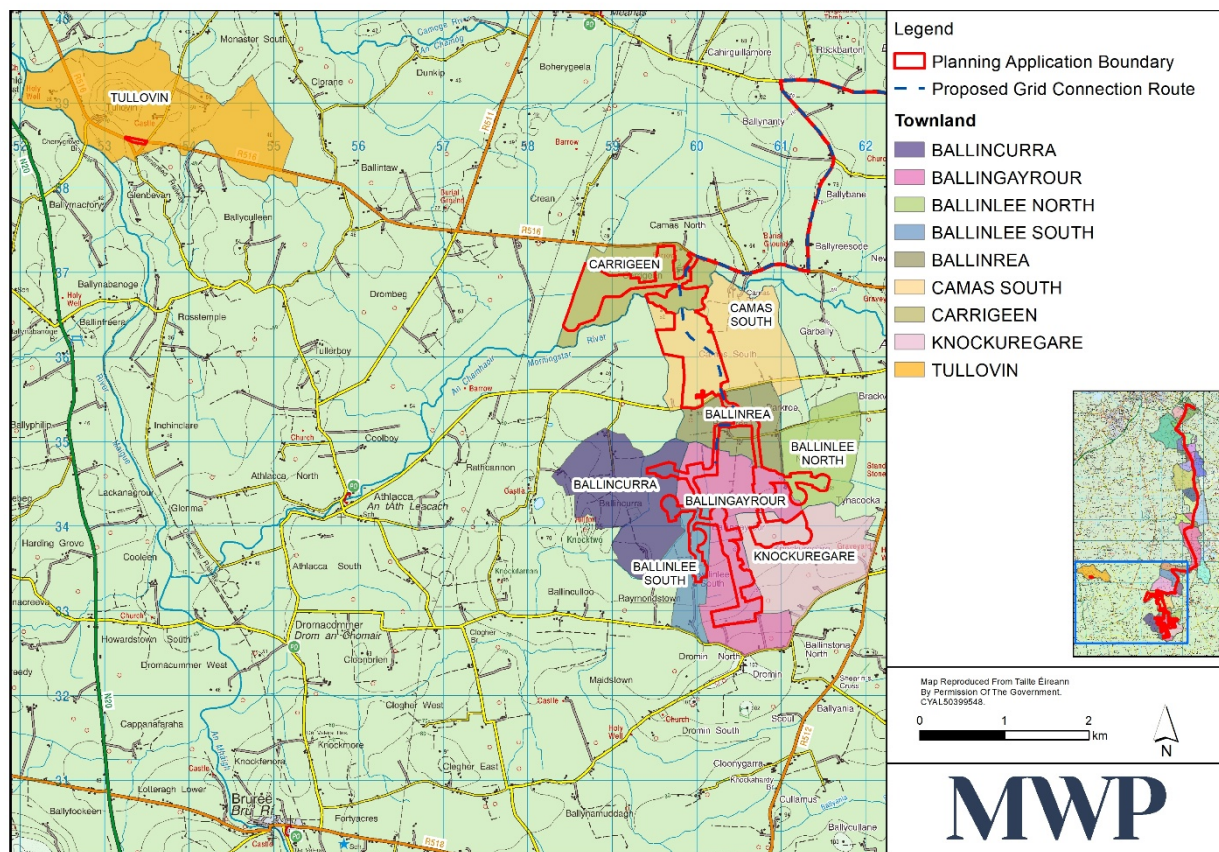


Figure 5-2: Townlands of the Main Wind Farm Site

5.3.3 Surrounding Population Centres

The proposed development is located approximately 18km south of Limerick City, the largest urban area in the vicinity. Other towns and villages surrounding the proposed development include:

- Bruff – c. 3km to the east;
- Athlaccá – c. 3.6km to the west;
- Killmallock - c. 5.2km to the south;
- Bruree - c. 5.5 km to the southwest;
- Fedamore - c. 6.6km to the north;
- Croom - c. 8.3km to the northwest;
- Knockainey - c. 8.6km to the east;
- Herbertstown - c. 9.2km to the northeast;
- Hospital - c. 10.2km to the east;
- Knocklong - c. 11.4km to the southeast;
- Charleville - c. 12km to the southwest;
- Kilfinane - c. 12.4km to the south; and
- Limerick City – c. 18km to the north.

5.3.4 Electoral Divisions and Small Area Populations

Electoral Divisions (EDs) are the smallest legally defined administrative areas in the State for which Small Area Population Statistics (SAPS) are published from the CSO, most recently 2022. Therefore, in order to discuss the receiving human environment and other statistics in the vicinity of the proposed development, the Study Area for this assessment has regard to EDs within or located close to the proposed development. The EDs (**Figure 5-3**) selected for the purposes of this assessment are outlined below. These were selected as the proposed development interacts with these EDs (planning application boundary within the ED).

- Abbeyville;
- Athlacca;
- Ballybricken;
- Ballysimon;
- Bruff;
- Crean;
- Dromin, and;
- Grange.

SAPs within the EDs identified for the assessment are illustrated in **Figure 5-4** and presented in **Table 5-6**.

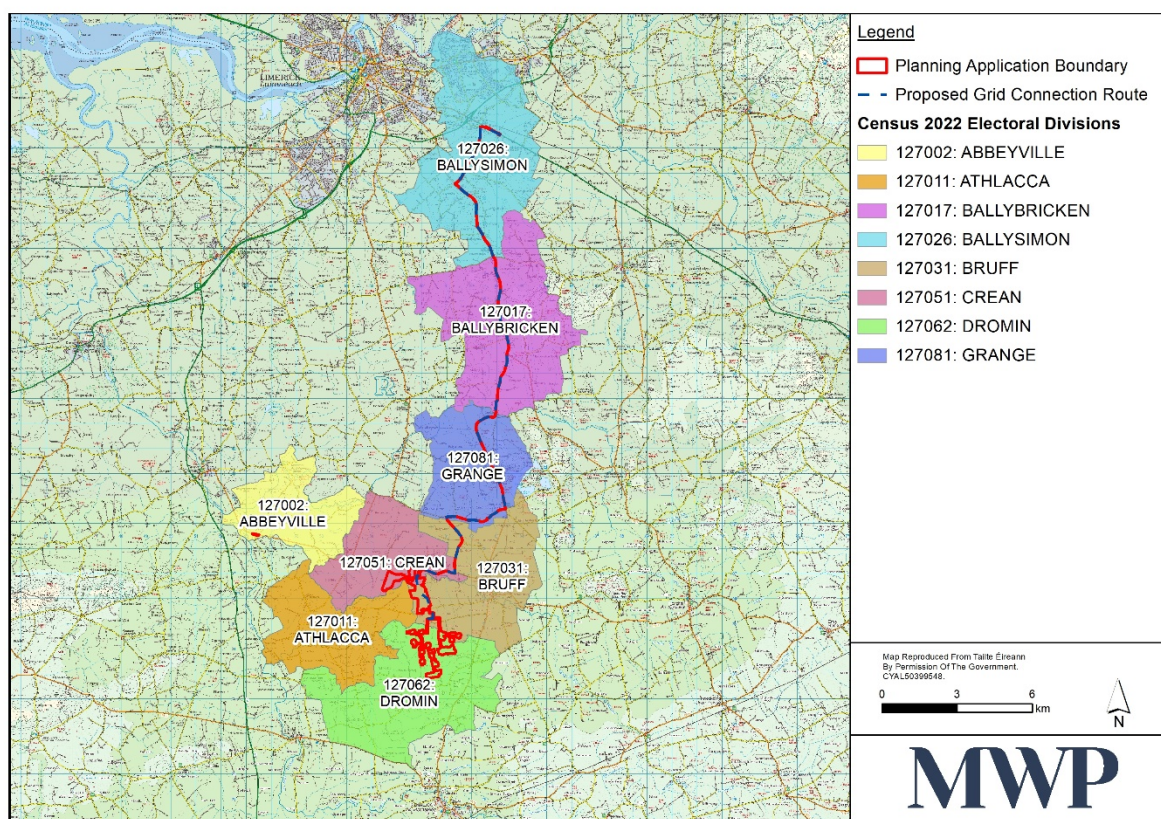


Figure 5-3: Study Area Electoral Divisions (EDs)

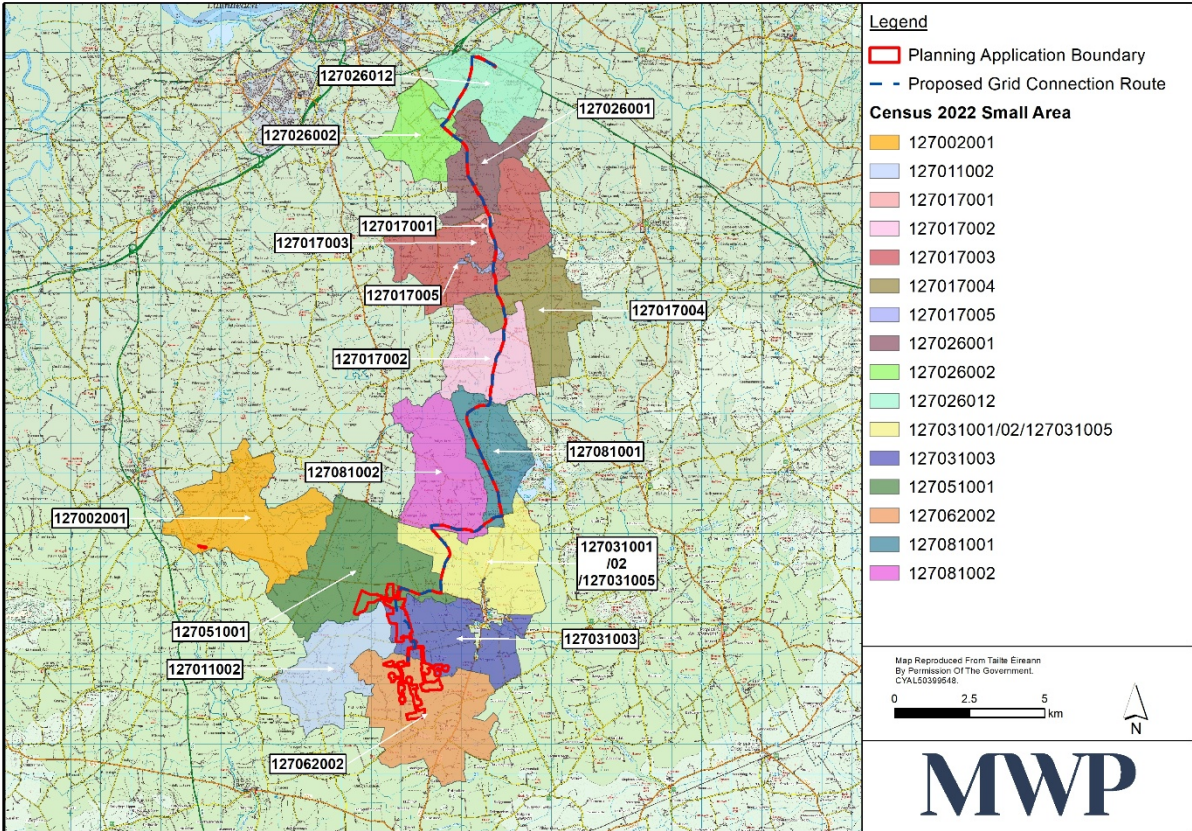


Figure 5-4: Small Area Population Districts (SAPs)

Table 5-6: Small Areas Population List

Abbeyville	Athlacca	Ballysimon	Ballybricken	Bruff	Crean	Dromin	Grange
A127002001	A127011022	A127026001	A127017001	A127031001/02/ A127031005	A127051001	A127062002	A127081001
		A127026002	A127017002	A127031003			A127081002
		A127026012	A127017003	A127062002			
			A127017004				
			A127017005				

5.3.5 Settlement Patterns

The proposed development is located in the townlands of Ballincurra, Ballinlee South, Ballingayrour, Ballinrea, Knockuregare, Ballinlee North, Carrigeen and Camas South (**Figure 5-2**). The site is situated in a rural area characterised by agricultural holdings and one-off residential dwellings. Some patches of forestry plantation occur within the proposed development and some on neighbouring properties.

The settlement pattern in the vicinity of the proposed development is characterised by dwellings and farm buildings located mainly along the public roads, with some dwellings (older and newer) located down long private lanes. An initial study area of 1.36km from wind turbine locations was established in accordance with Wind Energy Development Guidelines, which is 10 times the rotor diameter of the proposed turbines. A 1.5km study area was then applied as a conservative approach to ensure any outlining receptors are captured in this assessment. The settlement pattern of the area surrounding the wind farm site is evident in the settlement patterns displayed in **Figure 5-5** which shows the distribution of dwellings along local roads. Using the conservative 1.5km study area, and applying it to the proposed wind turbines, 279 dwellings were identified.

The existing Draft Revised Wind Energy Development Guidelines published in December 2019 has a specific planning policy requirement, SPPR 2, which states a setback distance for visual amenity to be 4 times the tip height of the relevant wind turbine, which for the proposed development is 640m for all turbines except Turbine 6 (600m for T6). The Guidelines state that the nearest point of curtilage of any residential dwelling must have a mandatory minimum 500m setback. Residential dwellings within the vicinity of the proposed development are shown in **Figure 5-5**.

Settlement patterns in the greater region range from small to medium community settlements and relatively isolated farmsteads. Charleville, approximately 12km to the southwest, is the largest town within the vicinity of the proposed development, with a population of 3,970 recorded in 2022. The town is a provider of major services and employment in the area and provides high quality transport connections via access to the N20, and Charleville train station. Other services include large retail shops, education for primary and secondary school students, access to a Further Education and Training facility, medical and childcare facilities, and sport and community clubs, such as Charleville GAA.

Smaller population centres in the general locality are the towns of Bruff, Croom and Kilmallock. These towns provide a range of local community facilities, including primary schools, sporting clubs, churches, general shops, and post offices to those residents in the vicinity. Smaller villages in the area include Hospital, Knocklong, Knockainey, Kilfinane, and Herbertstown, and provide some small-scale services such as local shops.

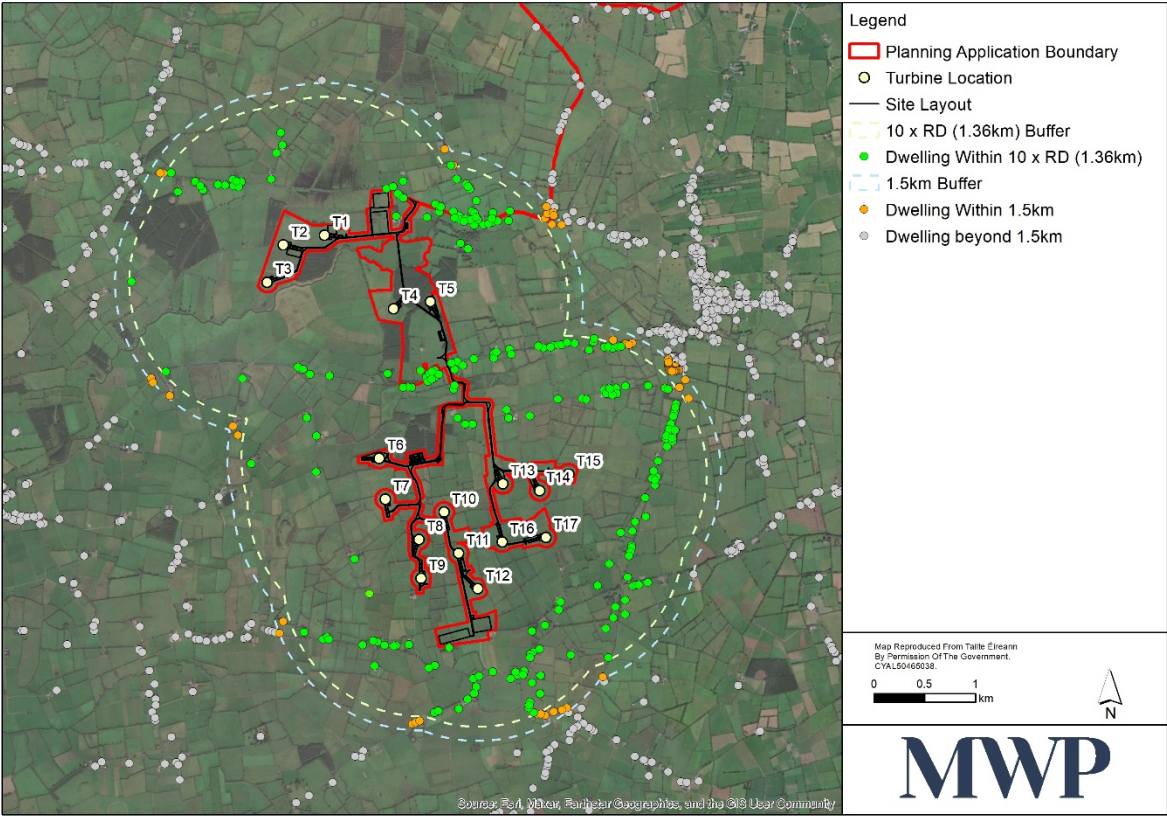


Figure 5-5: Settlement patterns within 1.36km and 1.5km of the proposed development

The Grid Connection Route (GCR) will be constructed primarily within the public road corridor and will entail several crossing points at road junctions and junctions with private lanes. The lands along the road corridor are mainly farmlands and private residential dwellings in ribbon developments. **Figure 5-6** and **Figure 5-7** show the GCR, separated into two parts, leaving the proposed development site to join the existing Killonan 220/110kV substation, located southeast of Limerick City. The length of the GCR is approximately 27.6km from the proposed substation.

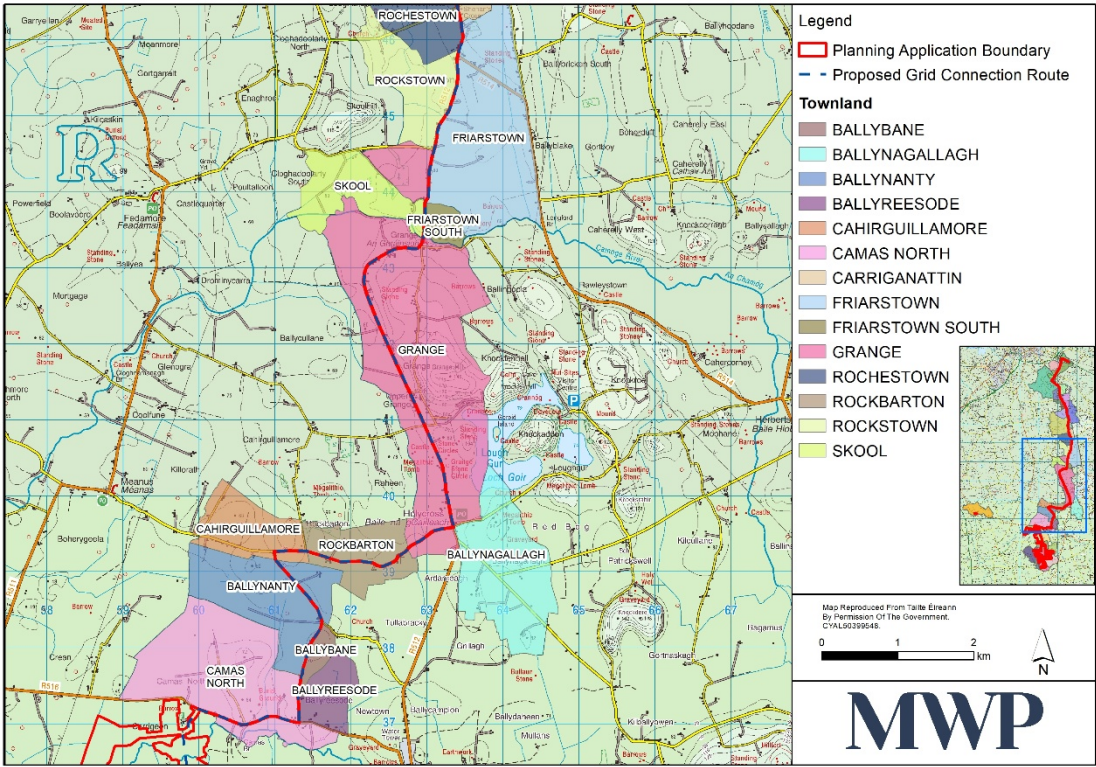
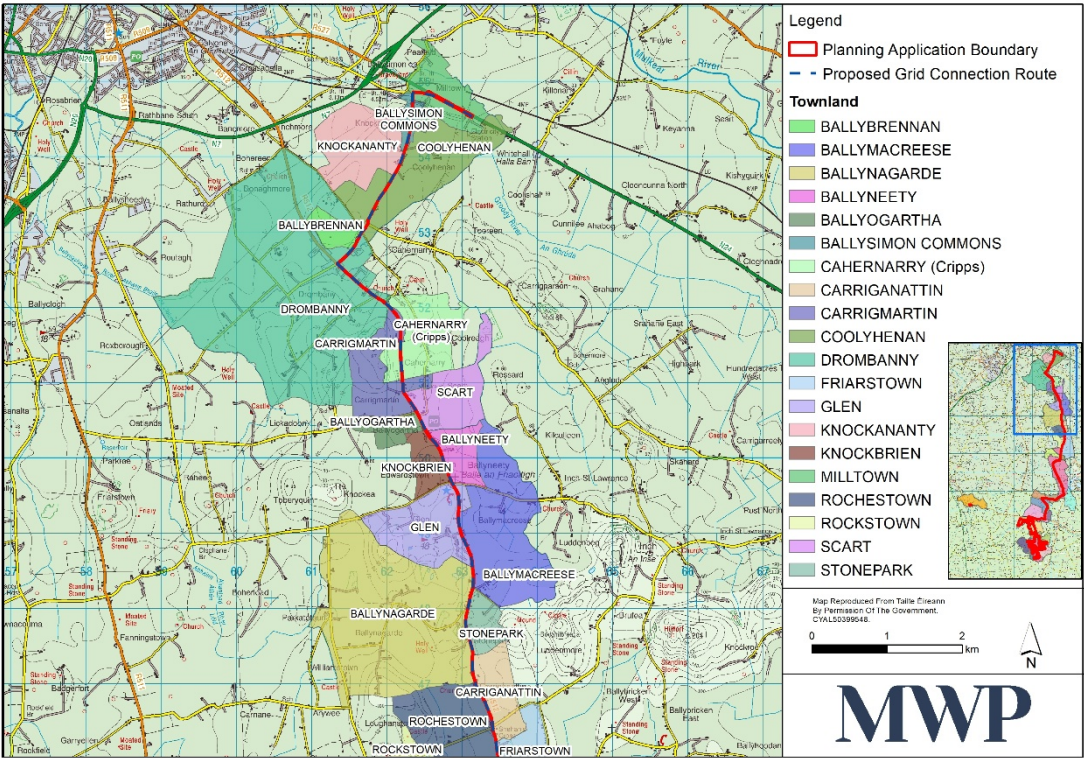


Figure 5-6: Section of GCR leaving the Proposed Development Site (Part 1 of 2)



5.3.6 Population Trends

In terms of the county, region and the state, population structure and change in Ireland are more strongly influenced by inward migration and emigration rates than by birth and death rates. The most recent population estimates for the country indicate that the combination of net inward migration and high birth rates has resulted in the population of Ireland reaching approximately 5.1 million in 2022, which represents an increment of c. 8% compared to the 2016 Census.

The 2016 Census recorded a total population of 19,061 in the proposed development study area as shown in Table 5-7. The 2022 Census results show an increase in the total population for the study area to 20,338, which represents an increase of 3,277 people from 2016 to 2022. According to the 2022 Census results, change in population for the Study Area from 2016 to 2022 (17.2%) is higher than that of County Limerick for the same period (7.5%) and that of the State total of 8.1%. The greatest population increase in the study area from 2016 to 2022 was in the Ballysimon and Abbeyville EDs, while Grange ED had the lowest population increase. This is matched by the population density statistics also provided by the CSO, with the Ballysimon ED being the most densely populated with 541 persons per km² and the Dromin ED being the least densely populated with 22 persons per km².

Table 5-7: Population Trends of EDs in vicinity of Proposed Development

Electoral Division	Population 2016	Population 2022	% Population Change
Abbeyville	353	411	16.4

Electoral Division	Population 2016	Population 2022	% Population Change
Athlacca	384	402	4.7
Ballybricken	1814	1932	6.5
Ballysimon	13590	16540	21.7
Bruff	1415	1460	3.2
Crean	412	463	12.4
Dromin	555	577	4.0
Grange	538	553	2.8
Study Area	19,061	22,338	17.2

(Source: CSO Census of Population 2016 and 2022)

5.3.7 Economic Activity and Employment

According to the 2022 census of population employment statistics for the region, the work force within the study area is employed in a diverse range of industries (**Table 5-8**). The statistics show that within the study area (the eight (8) EDs the proposed development interacts with) the highest level of employment is within the Professional Services' industry, with 2,561 individuals employed in that sector. Other notable employment sectors include Commerce and Trade with 2,053, and Other, employing 2,003 individuals in the study area. The Agriculture, Forestry, and Fishing sector has the lowest number of individuals employed in the study area, with 229. Building and Construction is the second lowest with 355. The proposed development has the potential to significantly impact this figure in a positive way during construction.

Commuter data was also gathered during the 2022 Census and was examined for this assessment. The majority of workers commute to work by car as a driver (5,338). Other than Not Stated, those who work mainly at or from home is the second largest group with 1,177. A breakdown of the methods of transport to work are provided in **Table 5-9**.

Table 5-8: Electoral Division Population Employment Statistics 2022 - Persons at Work Industry

Electoral Division	Agriculture, forestry, fishing	Building and construction	Manufacturing industries	Commerce and trade	Transport / Communication	Public admin	Professional Services	Other	Total
Abbeyville	14	14	18	26	11	11	35	39	168
Athlacca	31	15	19	26	6	13	50	23	183
Ballybricken	34	31	133	218	63	57	212	136	884
Ballysimon	42	191	1051	1523	664	281	1902	1640	7294
Bruff	29	47	83	132	44	32	174	71	612
Crean	18	13	34	37	10	12	55	46	225
Dromin	43	25	40	45	6	17	62	26	264

Electoral Division	Agriculture, forestry, fishing	Building and construction	Manufacturing industries	Commerce and trade	Transport / Communication	Public admin	Professional Services	Other	Total
Grange	18	19	36	46	15	25	71	22	252
Total	229	355	1414	2053	819	448	2561	2003	9882

(Source: CSO Census of Population 2022)

Table 5-9: Means of travel to work

Electoral Division	On Foot	Bicycle	Bus, minibus or Coach	Train, Dart or Luas	Motorcycle or scooter	Car Driver	Car Passenger	Van	Other (including Lorry)	Work mainly at or from home	Not stated
Abbeyville	4	1	0	0	0	86	7	13	0	10	47
Athlacca	9	0	1	0	0	113	4	23	2	19	12
Ballybricken	6	1	5	1	4	537	19	56	3	112	137
Ballysimon	346	147	249	11	12	3764	199	175	8	905	1422
Bruff	41	6	6	0	0	402	26	54	9	48	16
Crean	8	0	1	0	0	106	10	13	0	17	68
Dromin	4	0	1	0	1	170	8	23	2	37	18
Grange	4	0	1	0	2	160	14	28	2	29	7
Total	422	155	264	12	19	5338	287	385	26	1177	1727

5.3.8 Land Use

All new development proposals have the potential to affect the local area character and human environment by physical disruption, severance or exclusion of users' ability to continue existing activities or the sterilisation of lands thus preventing any additional further land-use potential.

Figure 5-8 shows the CORINE Land use classification (2018), which outlines that the proposed development occurs on predominantly agricultural lands and in a rural setting. The majority of the wind farm section of the proposed development occurs on Pastures (231), with some areas of Coniferous Forest (312) present. Some sections of these forested areas will require removal to facilitate the delivery and construction of some of the windfarm infrastructure, with an estimated removal of approximately 14.4 ha of forestry. For the purposes of this project, the location of any replanting (alternative afforestation) associated with the project will be outside any potential hydrological pathways of connectivity i.e., outside the catchments within which the proposed project is located and also at a distance so as to not create any potential cumulative effects. The developer commits to not commencing the project until both felling and afforestation licenses are in place and this ensures the afforested lands are identified, assessed and licensed appropriately by the relevant.

The land use surrounding the proposed grid connection route is characterised primarily by rural agricultural settings, however, as the alignment follows the existing road transport network, it also traverses limited areas of urban settlement. The proposed GCR occurs on land classed as Road and Rail Networks (122). The area that surrounds the GCR is classed as Pastures (231), matching the proposed development site of the windfarm and in line with the agricultural lands and rural setting of the proposed development.

An examination of the 2020 Agricultural Census data for the study area by electoral division indicates that agriculture in the area, where the proposed development will be located, is predominantly livestock farming with the average size of holdings being approximately 43.3ha (Table 5-10). The analysis focuses on the three Electoral

Divisions (EDs) in which the wind farm site is located, as these are the only areas where land use change will occur. The remaining five EDs are traversed only by the grid connection route, where no change to existing land use is expected, and therefore were not included in the agricultural output analysis. The standard median value of agricultural output for Limerick County in 2020 was between €15,000 and €20,000 per annum/Ha (Figure 5-9). This is a moderate to low level of output compared to other counties in Ireland.

Table 5-10: 2020 Agricultural Census Data per Electoral Division (CSO)

Agricultural Census 2020	Electoral Division			
	Bruff	Crean	Dromin	Total
Number of Holdings	45	25	63	133
Average size of holdings (Ha)	42.5	36.5	50.9	129.9
Livestock Units (LSU)	2,587	1,609	6,088	10,284
Area Farmed (Ha)	1,912.70	912.70	3,207.30	6,032.70

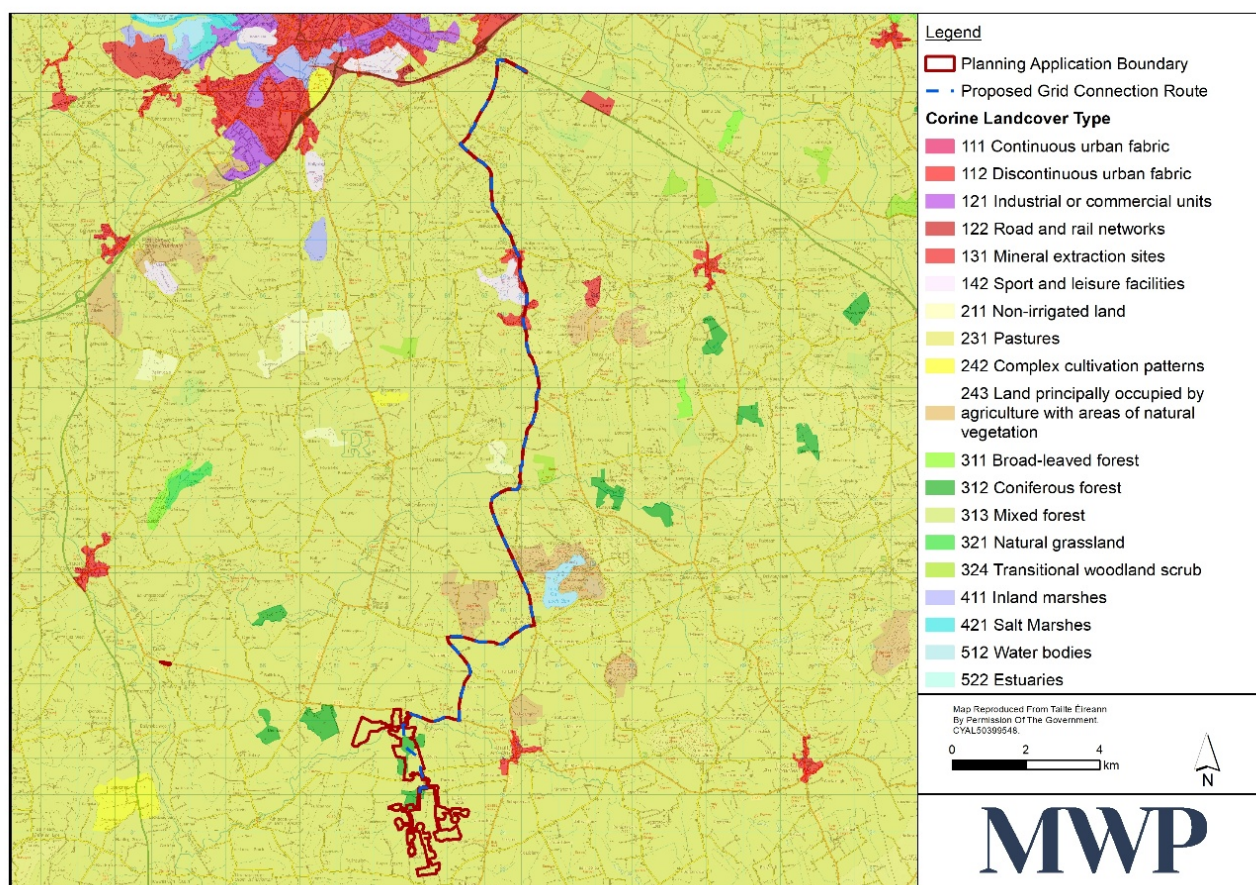


Figure 5-8: CORINE Land Cover of the Study Area

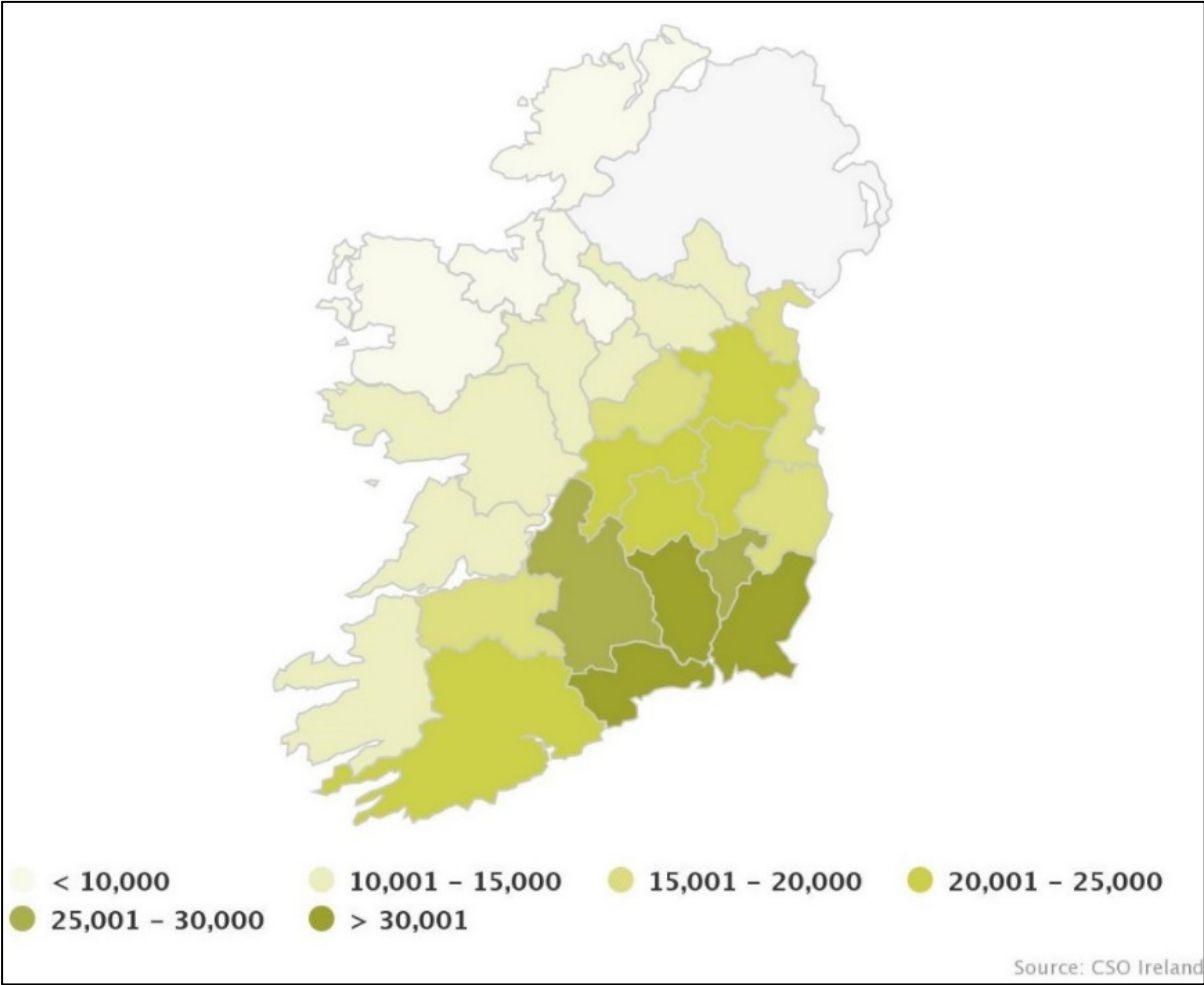


Figure 5-9: Standard Median Agricultural Output per County in 2020 (CSO Agricultural Census)

5.3.9 Tourism and Amenities

The information found in this section of the chapter is taken from Fáilte Ireland and the Limerick Development Plan 2022-2028. The Fáilte Ireland recognised tourist attractions are shown in **Figure 5-10**.

There are no recreational amenities located within the boundary of the proposed development and therefore impacts are not expected during the construction phase of the proposed development, however there are a number of recreational amenities in the wider area.

Lough Gur is a horseshoe lake near Bruff, located approximately 4.7km northeast of the proposed development and is part of the Wild Atlantic Gateway and Ireland's Hidden Heartlands tourism experiences. The significance of the lake comes from the significant archaeological record located at and around the area. The visitor centre located at Lough Gur recorded 100,000 visitors in 2023, the second largest tourist attraction in Limerick County after King John's Castle. The visitor centre allows for tours of the Lough and surrounding area, with access to other historic sites such as Grange Stone Circle and the Lough Gur Wedge Tomb. Recreational water activities such as kayaking are also available to visitors on the Lough. The Visitor Centre has an exhibition showcasing the archaeological history of the area and the importance of the lake to the character and history of the area. It is of note the proposed GCR will follow the R512, which is adjacent to the Lough Gur. Within the town of Bruff, tourists can visit The Black Castle, the Thomas Fitzgerald Centre, and the Old Irish Ways Museum, which recorded 300 visitors in 2023.

Kilfinane is approximately 12km southeast of the proposed development. The Kilfinane Outdoor Education Centre hosts a variety of events to visitors and tourists, including kayaking, canoeing, river walking, orienteering, abseiling, hill walking and mountain biking.

Other major recreational amenities in the area include the Knockfierna Famine House and Trail, a looped walking trail approximately 15km west of the proposed development. To the south c. 15km away, are the Ballyhoura Mountain Bike Trails, Ireland's largest off-road cycling network. This area also features a variety of hiking trails to users. The area of Ballyhoura is also marketed as a tourist and visitor destination, offering a variety of activities and experiences such as the aforementioned mountain biking and hiking, and access to historical sites such as Glenstal Abbey and Castlegarde Castle, and festivals such as the Joyce Brothers Music Festival and the Ballyhoura Walking Festival.

As outlined in more detail in **Section 5.3.5**, general amenities and services exist at varying scales throughout the various towns and villages within the vicinity of the proposed development.

An assessment of the visual impact the proposed development may have on the surrounding area, and the amenities within, is found in **Volume II, Chapter 12** Landscape and Visual Impact Assessment of this EIAR.

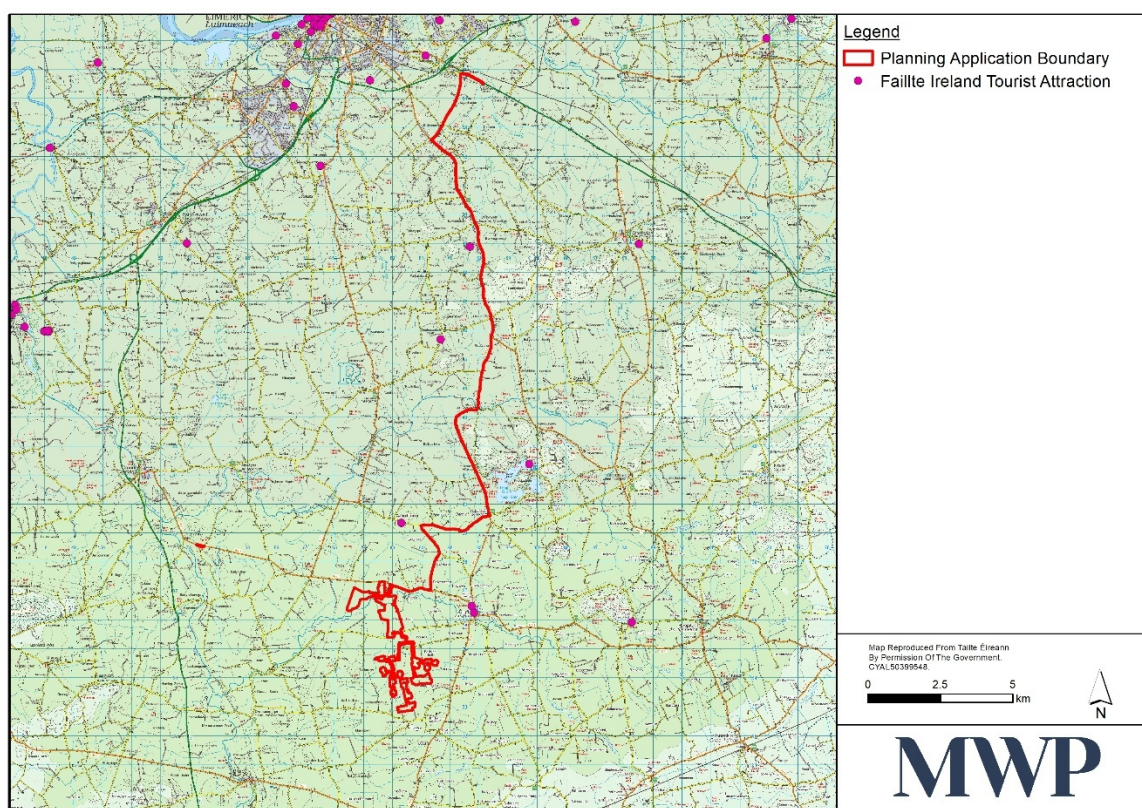


Figure 5-10: Fáilte Ireland Tourist Attractions in the vicinity of the Proposed Development

5.3.10 Human Health and Wellbeing

The Healthy Ireland Framework 2013-2025 defines health as “everyone achieving his or her potential to enjoy complete physical, mental and social wellbeing. Healthy people contribute to the health and quality of the society in which they live, work and play”. The Framework also states that health is much more than an absence of disease or disability, and that individual health, and the health of a country affects the quality of everyone’s lived experience³.

The 2022 Census gathered information on the general health profile of the population for each ED as seen in **Table 5-11**. The statistics show that, overall, the local population has good health with 78% of the population in the study area reporting ‘Very Good’ or ‘Good’ health. Less than 2% of the proportion of the population in the study area reporting to have ‘Bad’ or ‘Very Bad’ health. 15% of the population recorded a response of ‘Not Stated’.

Table 5-11: Health Statistics

Electoral Division	Very Good Health	Good Health	Fair Health	Bad Health	Very Bad Health	Not stated	Total
Abbeyville	176	101	36	6	1	91	411
Athlacca	220	117	31	3	2	29	402
Ballybricken	1,057	463	123	10	7	272	1,932
Ballysimon	8,667	4,061	867	152	37	2,756	16,540
Bruff	760	473	150	30	7	40	1,460
Crean	182	132	22	4	2	121	463
Dromin	317	161	51	7	0	41	577
Grange	314	173	42	10	2	12	553
Total	11,693	5,681	1,322	222	58	3,362	22,338

Source: Census of Population 2022

³ Gov.ie - Healthy Ireland Framework 2019-2025. Available at <https://www.gov.ie/en/publication/e8f9b1-healthy-ireland-framework-2019-2025/> assessed on 26/02/2025.

5.4 Assessment of Potential Effects

5.4.1 Construction Phase

5.4.1.1 Population and Settlement Patterns

As it is expected that construction personnel will be locally sourced, it is unlikely that there will be a significant number of employees involved in the construction that may decide to re-locate in the short/medium term or rent accommodation. Any direct and indirect jobs created or supported during the 24-month construction stage would be temporary in nature. It is envisaged that 80 jobs will be created during the construction phase of the project.

In the absence of any substantive, peer reviewed Irish studies on the effect of wind farms on property values, recent studies from the United States and Scotland are considered. The largest study of the impact of wind farms on property values was carried out in the United States. *'The Impact of Wind Power Projects on Residential Property Values in the United States: A multiSite Hedonic Analysis'*, December 2009, was carried out by the Lawrence Berkley National Laboratory (LBNL) for the U.S Department of Energy. It concluded that "no evidence was 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".

The study was updated by Lawrence Berkeley National Laboratory (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. It concluded that no statistical evidence was found that "home prices near wind turbines were affected in either the post-construction or post announcement/pre-construction periods".

A more recent study published by Climate Exchange in October 2016 titled *'Impact of wind Turbines on House Prices in Scotland'* concluded that there was "no evidence of a consistent negative effect on house prices".

Taking these studies into consideration, it is not anticipated that the proposed development will have any detrimental effect on the local property values.

The proposed development is deemed likely to have **neutral, localised, short-term effects** in the area of the proposed development due to the majority of construction personnel being sourced locally, and a small amount of personnel potentially relocating to the location of the proposed development for the 24-month construction phase. Along with the evidence that housing is not devalued in the area where windfarms are presented as discussed, it is considered the proposed development will have **imperceptible significance** to population and settlement patterns during the construction phase.

5.4.1.2 Economic Activity and Employment

During the construction phase, it is envisaged that resources and labour will be sourced in the region where possible. Aggregate and concrete supply for track construction and foundations will be obtained from local quarries operating in the area, while local suppliers will also be engaged when necessary, extending the economic reach of the proposed development into the local economy. It is the intention of the developer to require the main contractor to use local sub-contractors, drivers, suppliers and materials wherever possible.

The construction phase will take approximately 24 months and may create approximately 80 direct jobs during its construction. Other services that would be required during the construction phase include engineering, consultancy, site investigation, surveying, and environmental assessment and monitoring, which will provide short-term employment opportunities, locally sourced where possible.

It is considered the construction stage of the proposed development will likely have a **direct, short-term localised, positive effect** on the employment profile of the study area. As stated approximately 80 construction personnel will be hired locally, and other services that would be required during the construction phase would be hired locally where possible. Material for construction will see local providers and quarries contacted first, to keep associated economic activity in the study area where possible.

5.4.1.3 Land Use

It is not anticipated that there will be any significant impacts on land-use in the surrounding area, outside the confines of the proposed development boundary. As far as possible, agricultural and grazing activities will continue in the vicinity of the proposed development. The land area required has been kept to a minimum to allow only for installation of wind farm infrastructure, thereby minimising changes in land-use in so far as possible. The areas surrounding the turbines, hardstands, blade set down areas, substation, met mast and site compound will be securely fenced for the duration of the 24-month construction period for health and safety purposes.

For the GCR, grid cabling will be installed in sections within the public road corridor. There will be rolling road closures in place to facilitate cabling works in combination with lane closures, partial road closures and stop/go systems. This will allow for the works to be completed efficiently and minimise disruption time for residents and businesses over the duration of the construction phase. Further detail regarding traffic management during the construction phase is found in **Volume II, Chapter 16** Material Assets – Traffic and Transportation.

All works will be planned and undertaken in full consultation with Limerick City and County Council, in particular the Roads Department/Roads Engineer for the area. A construction stage Traffic Management Plan (TMP) is included in the EIAR (**Volume III, Appendix 16A**) and will be further developed with Limerick City and County Council in advance of works.

There will be tree felling required to accommodate the construction of infrastructure at certain sections of the proposed development site. The total area of felling proposed for the proposed development is 14.4 ha. To offset this, replacement planting will be appropriately planned, sited and licensed in accordance with relevant forestry legislation. All necessary felling licences will be acquired from the Forest Service of the Department of Agriculture, Food & the Marine.

Overall, the impacts during the construction phase are considered to be likely **short-term, neutral, localised** and of **slight effect** in the context of social considerations and existing land use in the area of the proposed development. This is determined by the minimising of land take from agricultural use, and the short-term duration of the construction phase. As stated, rolling road closures, stop go systems and partial road closures will be utilised in the construction phase of the GCR to minimise disruption to the local road network.

5.4.1.4 Tourism and Amenities

The development site is not currently used as a forest park or recreation site. Given that there are currently no tourism attractions specifically pertaining to the proposed development there are no direct effects associated with the construction phase of the proposed development.

There are important tourist and amenity attractions within the study area of the proposed development, as discussed in **Section 5.3.10**. Construction personnel in the area travelling to and from site, and the delivery of supplies and materials will see an increase of vehicle use on the local road network, which may impact access to the local tourist attractions and amenities. No turbines are planned to be erected until the final phase of construction. There may be some impact from noise and dust associated with the increase of traffic on the local road network also, but this would be short in duration and isolated to scheduled delivery times and start and finish times for works on site. Throughout the construction phase there will be a road cleaning programme

implemented to reduce dust impact and continual inspection of the condition of the roads used. The proposed development is not in close proximity to any recognised tourism amenity, as shown in **Figure 5-10**, and it is determined there will be no long-lasting impact on these amenities during the construction phase. The Maigue River Trust identifies the potential for river walks to be enhanced along the Morningstar river, which interacts with the site. However, it is not considered to be affected by the construction phase of the proposed development.

The effect of the proposed development during the construction phase on tourism and amenities is therefore considered to be **localised, neutral, short-term** and of **imperceptible effect**. Further information regarding visual impact assessment in the area and traffic management are found in **Volume II, Chapter 12** Landscape and Visual Impact Assessment of this EIAR and **Volume II, Chapter 16** Material Assets – Traffic and Transportation of this EIAR.

5.4.1.5 Human Health and Wellbeing

Development works not only can pose safety risks but can give rise to potential impacts on general amenity affecting health and well-being. General amenity is to do with the pleasant, amenable qualities of a place as it is used and perceived by the people who reside, frequent or view it. There are a number of general elements that contribute to or detract from the amenity of an area. Disturbances associated with construction activities such as noise, dust, and traffic are potential factors for devaluation of amenity. As the turbines will not be commissioned until the end of the construction phase, no construction phase shadow flicker impacts will occur. The potential impacts of shadow flicker are only applicable during the operational phase.

The dwellings within close vicinity of the windfarm (**Figure 5-5**) may experience some disturbance during the construction phase due to haulage and construction vehicle traffic, and general noise created during the construction phase. However, noise from these sources is predicted to be short-term and not constant over the duration of the construction phase. Works on the main wind farm site will be limited to the times set out by the planning authority, which are assumed to be 07.00 – 19.00 Monday to Saturday. There are also no existing residential dwellings located within 600m of any of the proposed wind turbines, further reducing the level of disturbance by construction noise on human health and wellbeing.

All best practice guidelines will be followed during the construction works, as outlined in the CEMP (EIAR **Volume III, Appendix 2A**) and TMP (EIAR **Volume III, Appendix 16A**) of this EIAR, to minimise the impact on the dwellings in the proposed development's receiving area that would affect human health and wellbeing. The GCR will follow the road network in the area to the existing 220/110kV Killonan substation, located approximately 27.6km north of the proposed development, and will result in limited localised and temporary disruption during its construction to local residents due to the generation of noise and dust generated. However, as the GCR will be constructed in sections, progress along the route will see disturbances limited to brief exposures for residents.

The proposed development is considered to have an **adverse, short-term, not significant** and **localised effect** on community health and well being due to the noise and dust generated during construction, operation of plant and deliveries to the site. However, the construction works will abide by the relevant guidelines, best practice and working hours set by the planning authority. The construction of the GCR will be undertaken in sections to reduce impact on human health and wellbeing, with noise disturbance being **brief** along the sections of the route. Employee health and wellbeing impact is anticipated to be a **slight, short-term** and **adverse effect** during the construction phase. This was concluded due to the construction personnels proximity to the plant operation and construction works.

Climate Change

Short term construction traffic-related air emissions have the potential to result in increases in carbon emissions and air pollutants, contribute to climate change, and adverse effect on policy efforts to reduce emissions. More indirect effects on climate change will be related to the emissions associated with the production and supply of materials (e.g. concrete and steel) for the proposed development which will operate at a much broader regional and international spatial scale.

The construction of the proposed development will increase the dust in the air in the locality over some of the construction period (24 months). The mitigation measures addressed in **Volume II, Chapter 10** Air Quality of this EIAR and **Volume II, Chapter 11** Climate of this EIAR will be implemented.

The proposed development is likely to result in a **moderate, adverse, short-term, and localised effect** on emissions during the construction phase (short-term) generated from construction activities and increased vehicle traffic in the area, as well as the manufacture and supply of materials required like concrete and steel, which may contribute to longer-term climate effects. It is however accepted that the proposed development will contribute positively over its lifetime with a CO₂ payback of 0.8 years (**Volume II, Chapter 11** Climate of the EIAR).

5.4.2 Operational Phase

5.4.2.1 Population and Settlement Patterns

During the operational phase of the proposed development, it is envisaged that any operators and maintenance personnel will be sourced locally. A change to population and demographic trends of the study area during the operation stage is not expected as there would not be any in-migration associated with the proposed development. Throughout the operation phase, it is considered that the effects on population and settlement patterns are likely to be **neutral, localised, long-term** with **imperceptible significance**.

5.4.2.2 Economic Activity and Employment

During the operational phase, the proposed development is likely to have minimal effect on employment. It is envisaged that any operators and maintenance personnel will be sourced locally. There is no known direct or indirect development likely to result from the proposed development. The effect during the operational phase is therefore considered likely to be **imperceptible, neutral, long-term** and **localised** on employment.

The proposed development will generate a Community Benefit Fund estimated at approximately €350,000 per annum for the local area over the first 15 years, totalling €5,250,000. In accordance with the guidelines set out by the Sustainable Energy Authority of Ireland (SEAI), the fund will be administered by a locally formed group/committee, with funds to be allocated to those living in proximity to the proposed development, initiatives and projects that support sustainable development within the local area and local clubs and societies. This in turn will result in **positive, moderate, long term** economic benefits to the local area.

5.4.2.3 Land Use

New development proposals have the potential to affect the local human environment by introducing a new incompatible land use activity, conflicting land use policy for the area, or result in significant land-use impact. It is considered that the proposed wind farm development would not constitute significant adverse impacts in terms of social and land-use considerations for the following reasons:

- There will be no severance, loss of rights of way or amenities as a result of the proposed wind farm;

- Agricultural activities will be able to continue on the lands immediately adjacent to the main wind farm infrastructure (i.e., Turbines and substation);
- In terms of impacts to neighbouring lands and land-uses, it is considered that the proposed wind farm development does not pose a significant risk to either existing or future land-uses. All existing land-use practices can co-exist with the proposed development;
- The proposed development is unlikely to have an effect on population numbers of the area. There will be no loss of residential dwellings and therefore there will be no displacement of the existing population. The windfarm will also have no significant adverse effect on the quality of life of neighbouring residents that may cause residents to move. There is unlikely to be any in-migration associated with the development. Therefore, the proposed development is considered to have a negligible effect on population numbers; and
- Land and property value may be economic or amenity in nature. The potential for the proposed development to devalue land and residential property in its vicinity is essentially dependent upon public perception of the development and perceived associated impacts. The wind farm development will not cause any material damage and does not pose any polluting or hazardous threat that would result in the devaluation of neighbouring properties. The development is thus deemed to have a neutral effect on land and property value.

The proposed development will have no long-term effect on the land uses in the proximity of the proposed site. During the operational phase (long-term), the proposed development is therefore likely to have an **imperceptible neutral effect** on land use.

In the long-term, the proposed development is expected to generate full-time employment for a small number of persons during its operational phase. During the operation of the wind farm, there is no known specific direct or indirect economic development likely to result from or be affected by the proposed project.

Overall, it is considered that the proposal would have a **long-term, neutral** effect during the operational and decommissioning stages.

5.4.2.4 Tourism and Amenities

It is not considered that the proposed development will affect any tourism infrastructure in the wider area during the operational phase. One of the key considerations for this proposed development is the visual effects from the important and well visited archaeological complex of Lough Gur approximately 4.7km to the northeast of the site. Three viewpoints were assessed for visual impact during the operational stage, VP17, VP18 and VP19. VP17 is from the Grange Stone Circle and VP18 is from the Lough Gur Wedge Tomb and neither has the potential for visibility of the proposed development, hence the effects are deemed **imperceptible**. VP19 is from the local road at the northern end of Lough Gur, which is afforded partial views along the alignment of the Lough itself. From here the partial blade sets of around three of the proposed turbines will be seen rising just above the terrain and vegetation that forms the skyline at the head of the lough. The turbines are a considerable distance away and read as a background feature that is discrete from the foreground setting. Consequently, the overall visual effect was deemed to be **moderate-slight**.

The turbines are seen at a small scale from the Kilfinane Scenic Drive and the Castleoliver Scenic Drive, deemed to be **slight** and **slight-imperceptible** respectively.

The internationally renowned Adare Manor Golf Course is contained on the outskirts of Adare over 15km away in and enclosed riverside setting where there will not be any visibility of the proposed turbines.

As the Mague River Trust suggests extending the riverside walk amenity along the Morningstar from Bruff, there is potential for it to interact with the proposed development during operation if extended far enough to reach the site. The proposed development is considered to have a **negligible** impact on this amenity if developed, and the turbines could act as a marking point along the route.

It is unlikely that works will be required on the GCR during the operational phase of the proposed development with exception for potential repair works if needed. The GCR during operational phase will be underground and thus have no impact visually on tourism attractions or amenities, having an **imperceptible** impact. **Chapter 12** Landscape and Visual provides a full assessment of visual impact of the proposed development on the surrounding environment.

5.4.2.5 Human Health and Wellbeing

It is not anticipated that the workings of the turbines will present any danger to the public. In addition, the wind turbines are on private lands and therefore public access is not available.

Potential electrical risks are associated with turbine transformers, switches and cabling. With adequate fencing and security, it is not envisaged that these will pose any significant risk, as these will fully meet health and safety regulations relating to high voltages. Access to the substation associated with the proposed development will be restricted to maintenance personnel only.

Blades can potentially fail through damage sustained in severe weather mainly through lightning strike or due to inadequate upkeep and maintenance. This is extremely rare, and the developer undertakes to operate and maintain all plant safely and in good working order on the site. Modern wind turbine design incorporates a fail-safe mechanism that comes into play under extreme weather conditions. This mechanism causes the turbines to automatically shut down in periods of excessively high wind-speeds.

Overall, the proposed development will have a net benefit on human health in the long term by contributing to the production of clean renewable energy. The operational phase of the development can however give rise to potential impacts on general amenity and human well-being. Disturbances such as noise emissions, shadow flicker effects and visual impacts are principal potential factors for devaluation of amenity. These are discussed in the following sections.

Noise

Potential sources of noise during the operation phase of the proposed development include mechanical noise from the gearbox or generator, aerodynamic noise from the rotor blades, and noise from the transformers and cooling fans in the substations.

Advances in the development of commercial wind turbines has led to mechanical noise being significantly reduced during operation. In relation to aerodynamic noise, noise predictions were undertaken at identified receptor locations closest to the turbines and substations. For the transformers and cooling fans, the noise is generally recognisable as a steady hum which arises from electric and magnetic forces within the transformer.

The separation distance between the windfarm and the nearest residential receptors aids in reducing the potential impact of noise from operation on human health and wellbeing. As part of **Volume II, Chapter 13** Noise and Vibration of this EIAR, software was used to predict noise levels from the turbines during the operational phase of the proposed development. The modelling results showed that the turbines would operate within the established criteria set out in the Wind Energy Guidelines 2006 and therefore would have **no significant** effect on human health and wellbeing.

Noise from the proposed substation and associated equipment was also considered in **Volume II, Chapter 13** Noise and Vibration of this EIAR, and was found to operate 13dB below the existing background noise level at the

closest noise sensitive location, for the worst-case scenario, which was the night-time period. The impact of the substation and associated equipment is there considered to be **not significant** and **imperceptible** to human health and wellbeing.

Visual Impacts

An assessment of the visual and landscape effect of the proposed development, including photomontages, has been undertaken and is presented in **Volume II, Chapter 12** Landscape and Visual of this EIAR. A total of 22 viewpoints were used to determine the visual effect of the proposed wind farm and associated grid connection. From these viewpoints, photomontages were prepared and a written assessment completed.

Given the size of the turbine structures, a visual consequence is unavoidable. The extent of intrusion will vary in degree and significance according to viewing distance, the numbers and parts of turbines visible, the number of viewers and the perception of the person viewing them.

The proposed position of the turbines will be in a relatively flat area. They will be visible from some views very close to the development and will also be visible from certain elevated long-distance viewpoints. Overall, the development is expected to have a **long-term** and **moderate** visual effect in that the proposed turbines will be apparent and recognisable as new elements within the landscape during operation.

The visual impact assessment also assessed the cumulative effect of the proposed development along with other planned or operating wind turbines in the area. The cumulative effect was not considered significant owing to the general Medium-low sensitivity of the receiving landscape and visual receptors. Refer to **Volume II, Chapter 12** Landscape and Visual of this EIAR for further details.

Air Quality

Volume II, Chapter 10 Air Quality of this EIAR presents an assessment of the effects on air quality from the proposed development. There is likely to be a **long-term** and **positive** effect from the operation of the turbines on air quality as it will replace fossil fuel energy sources such as coal and oil. It is estimated over the operational lifespan of the proposed development that 2.5 million tonnes of CO₂ will be offset.

Traffic

Once operational, the development will for the most part be monitored remotely with only occasional trips generated by maintenance and monitoring personnel. This would generate a relatively low volume of vehicles. Therefore, there will be negligible operational stage traffic impacts associated with the proposed development. Hence, the proposed operational phase would have **imperceptible to not significant** traffic effect.

Community Benefit Fund

An important part of modern wind farm developments is the implementation of community benefit schemes and a commitment to community gain. The concept of directing benefits from wind farms to the local community is promoted by the DCEE through the new RESS scheme, the National Economic and Social Council (NESC) and Wind Energy Ireland (WEI) among others. The proposed development will result in a community fund estimated at €350,000 per annum for the local area for the first 15 years of operation, totalling €5,250,000, providing a substantial opportunity for development of the local area.

Climate Change

The proposed wind farm will facilitate decarbonisation objectives at local and national levels as set out in the 2025 National Climate Action Plan and the 2022 - 2028 Limerick Development Plan which states that Limerick City and County Council will facilitate the development of energy sources which will achieve low carbon outputs. The

project is estimated to offset approximately 2.5 million tonnes of CO₂ during its operational lifespan. The proposed development will therefore have a **long-term, direct, slight, positive** and **extensive** effect on climate change.

Shadow Flicker

Shadow flicker is defined as the alternating light intensity produced by a wind turbine as the rotating blade casts shadows on the ground and stationary objects, such as the window of a residence.

The proposed wind turbines will be equipped with a shadow flicker module to prevent shadows at critical times, to ensure there is no shadow flicker at sensitive receptors/nearby dwellings during the wind farm operational phase. Further information is found in the shadow flicker assessment carried out in **Volume II, Chapter 15** Shadow Flicker of this EIAR.

5.4.3 Decommissioning Phase

Once the operational period is complete, a detailed Decommissioning Plan will be drawn up to ensure the safety of the public and workforce and the use of best available techniques at the time. The Decommissioning Plan will be agreed with the competent authority at that time.

The proposed development has been designed to have an operational life of 35 years and any further proposals for wind farm development at the site after this time will be subject to a new planning permission application. If planning permission is not sought after 35 years, the site will be decommissioned and reinstated with all wind turbines and towers removed. Upon decommissioning, all that will remain will be the access tracks. The substation will also remain in place as part of the permanent electrical infrastructure.

In the decommissioning stage, it is likely cranes of similar size to those used for construction will disassemble each turbine. The towers, blades and all components will then be removed. The turbines and monitoring mast will also be removed from site. It is likely that turbine components where possible will be reused as they have a life well in excess of the wind farm proposal i.e., greater than 35 years. Wind farm components may also be recycled.

Wastes generated during the decommissioning phase will be taken off site and disposed of appropriately by a licensed waste operator.

Underground cables will be cut back at the turbine termination points and likely left underground as removal may do more damage than leaving them *in situ* after the operational lifespan of the proposed development.

Hardstand areas will be remediated to match the existing landscape thus requiring revegetation. Access tracks will be left for use by the landowner. The current view is that the disturbance associated with the removal of the elements (hard core and sediment) would be more deleterious than leaving them in place.

The potential effects of decommissioning are the same as those associated with the construction stage, however reduced in magnitude. The decommissioning phase will have no significant effects once mitigation measures prescribed for traffic, noise and dust effects are implemented as described in the relevant EIAR chapters.

5.4.4 Do-Nothing

An alternative to the proposed development of Ballinlee wind farm is to leave the site as it is currently being utilised for agricultural and forestry purposes. There will be no changes to the baseline environment of the site and existing activities such as agricultural activities and periodic tree felling will continue.

There will be no increases in local employment and the economic benefit via the community benefit fund will not be realised.

The potential emissions from the construction phase will not be created and there will be no potential for noise, shadow flicker or visual effects. However, the local, regional and national benefits which accompany the proposed development associated with the replacement of fossil fuels with renewable energy will be lost. An alternative candidate site (onshore or offshore) will be required to be identified so that Ireland can meet its carbon emission reducing objectives associated with the Climate Action Plan 2025.

5.4.5 Cumulative Effects

The potential for cumulative or in-combination effects is considered where relevant. A cumulative impact arises from incremental changes caused by other past, present or reasonably foreseeable future actions together with the proposed development.

The proposal is situated in a highly modified, intensively managed, agricultural landscape. The main activities with which the proposed wind farm could potentially interact synergistically are considered to be agriculture, afforestation, roadworks and other wind farms/renewable developments. The potential for cumulative impacts on the local population and human health, specifically noise, dust, and traffic are discussed in relevant chapters of this EIAR.

Small scale planning applications for dwellings in proximity to the proposed development have been considered in the cumulative assessment. There is potential for some cumulative construction traffic and noise effects should these projects be constructed in parallel with the proposed wind farm. This is unlikely however, as potential construction works for the proposed project are not expected to be initiated until Q4 of 2028. Consequently, the potential for cumulative effects during construction will not occur. Other small planning applications within a 3km radius around the development site relate to agricultural sheds and shed extensions, livestock facilities, dwelling houses, and extensions to dwelling houses, attic conversions, domestic wastewater treatment systems, property entrances and roads, sports facilities, garages, demolitions, and retention permission applications etc. The construction of this development will likely be completed, and their planning permissions expired by the time construction of the proposed project would potentially begin in 2028. Consequently, such dispersed small scale domestic and agricultural developments are not expected to have significant cumulative effects with the proposed project. These minor projects are either under the threshold for EIA or excluded from the list of projects requiring EIA and due to the nature and scale of these applications would not introduce complex or significant issues and are therefore not considered in the cumulative assessment.

Other existing wind energy development in proximity to the proposed Ballinlee wind farm have potential to cause cumulative noise and visual effects in combination with the proposed project. Any permitted and proposed wind farms in the area may also have cumulative effects should the construction phases overlap with the proposed project. The energy produced by the proposed project would positively cumulate with other wind farm developments in the region to advance in delivering local, regional, and national Green Energy targets.

Other renewable energy projects that have been identified within 20km to the proposed development include several solar farms and anaerobic digesters.

There are 9 existing or permitted solar farms within 20km of the proposed development (See list in **Section 1.4.4** of **Volume II, Chapter 01** of this EIAR). The nearest proposed solar farms to the proposed development are the Ballycullane Solar Farm located 6.9km from Ballinlee WF and Engie Development Ireland Ltd. located 7.8km from Ballinlee WF. These projects were granted planning permission in June 2018 and August 2018 respectfully. There is also 1 solar farm c. 10km east of Ballinlee WF that is in pre-planning and 1 proposed anaerobic digester in Co.

Limerick that is approximately 10 km west of the proposed development. The majority of the cumulative effects from these projects will be related to the construction phase if they are to overlap.

The list of all projects considered for the cumulative assessment are included in **Section 1.4.4 of Volume II, Chapter 01** of this EIAR. Each of the projects listed were considered with respect to potential cumulative effects on population and human health.

5.4.5.1 Population and Settlement Patterns

Cumulative effects with the other proposed developments in the area may experience a small change in population if high level workers choose to relocate during the construction phase of these developments. This is considered to be insignificant if it were to occur given this would be a small number of individuals and the duration of the construction phase of these projects being short-term once construction begins.

During operation, there will be maintenance workers visiting the proposed windfarm, and this will be the same for other developments of a similar type in the area. The level of maintenance worker calls in general would be low, and it is unlikely they will all happen at the same time.

Overall, the cumulative impact on the study area in relation to population and settlement patterns is considered to be **long-term**, **moderate** and have **neutral** effects.

5.4.5.2 Economic Activity and Employment

Workers for the Ballinlee Wind Farm will be sourced locally where possible. It is envisaged that similar proposed developments will also take this approach for their proposed development. This will have a significant direct effect on the local economy and employment in the area. Indirectly, the presence of workers cumulatively at these projects, if there is some overlap during the construction phase, will see positive impacts on retail in the area, in particular food and beverage establishments.

During operation, maintenance workers will travel to the area, although the frequency of this is likely to be low unless there is a significant issue or incident. Cumulatively, it is considered that there will be a **significant positive**, **short-term** effect on employment and economic activity in the local area.

5.4.5.3 Land-Use

Figure 5-11 shows that the majority of windfarm developments in the area occur south and west of the proposed development. Cumulatively, these developments will result in some land use loss, which is predominantly agricultural according to CORINE land cover maps for the area. As outlined in **Table 5-10**, which focuses on the three Electoral Divisions in which the wind farm site is located, a total of 6,032.70 ha of land is classed as farmed area within the study area. The size of the farmed area compared to the cumulative land take required for the various developments is minimal in scale. It is therefore considered cumulatively that the effects would be **neutral**, **slight** and **long-term** regarding land use in the area with other proposed developments given the minimal land take required developments.

While there are also solar farm developments in the wider area, their land take is not considered directly comparable to windfarms. This reflects differences in how the two types of infrastructure interact with existing land uses (ongoing agricultural compatibility) and the extent to which they result in permanent land use change. For this reason, the cumulative land-use impacts of solar farms are not considered equivalent to those arising from windfarm development.

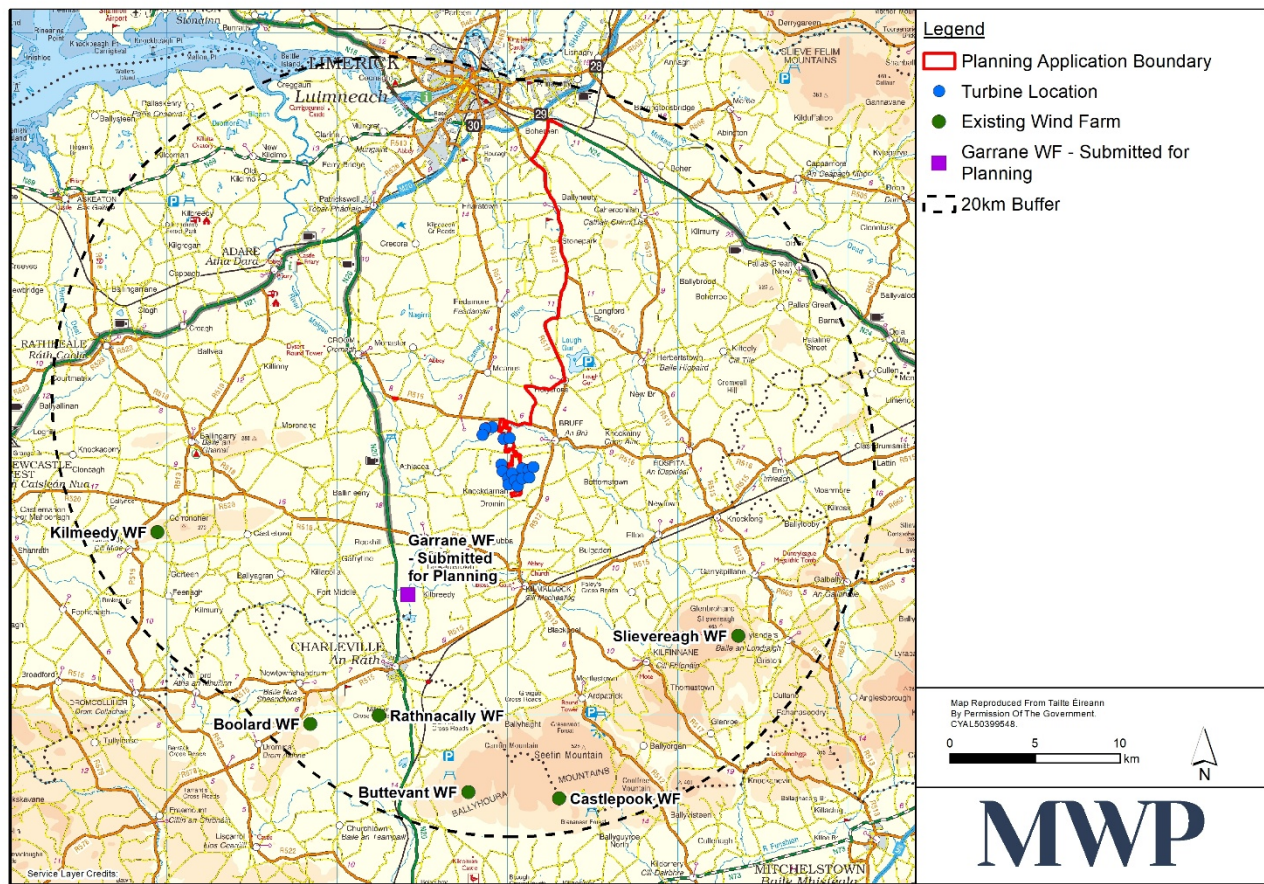


Figure 5-11: Neighbouring Windfarm Developments

5.4.5.4 Tourism and Amenities

Cumulatively, the proposed development is relatively separate compared to other existing windfarms operating in the 20km buffer, as shown in **Figure 5-11**. The 20km buffer is provided in the revised 2019 Wind Energy Development Guidelines for turbines with blade tips greater than 100m. The consideration of cumulative landscape and visual effects is placed principally on the cumulative wind energy developments in the area. EIAR **Volume III, Appendix 12B** provides a cumulative Zone of Theoretical Visibility (ZTV) map which shows bare ground intervisibility between the proposed development and all existing and permitted turbines. Given the topographical character of the area within the 20km buffer, the cumulative ZTV indicates that from over 85% of this area, theoretical visibility of the proposed development in conjunction with existing and pre-planning turbines is possible. There is unavoidable visual impact cumulatively from tourist and amenity facilities regarding the existing and pre-planning wind farm developments in the area, however, this is not envisaged to have an adverse impact on their operation and use. Therefore, the overall cumulative impact is considered to be **likely, slight, and long-term**.

5.4.5.5 Human Health and Wellbeing

Construction of the proposed development will result in increased traffic on the local road network, noise emissions from construction vehicles and equipment and from fugitive dust resulting from ground-disturbance activities. Any cumulative effect with existing development is catered for in the background receiving environment studies.

In considering cumulative effects with other planned or approved projects, construction effects will have a cumulative impact on the receiving environment, only if other reasonably foreseeable proposals are constructed in close vicinity to the proposed development construction and at the same time.

Therefore, cumulative impacts related to human health and wellbeing have the potential to arise locally when construction activities associated with the proposed development take place at the same time as other developments in a specific location. These effects are considered to be **temporary, short-term** and of **slight significance** when assessed cumulatively with the proposed development.

Noise cumulative impacts are assessed in **Volume II, Chapter 13** Noise and Vibration of this EIAR. Predicted noise levels from these turbines confirm that there is no potential for cumulative impacts, as they are at least 10 dB below the predicted noise levels from the Proposed Development at the nearest noise-sensitive locations (NSLs). Therefore, cumulative noise impact with other developments on human health and wellbeing is considered **imperceptible**.

Volume II, Chapter 15 Shadow Flicker of this EIAR also undertook a cumulative shadow flicker assessment of proposed projects with which significant cumulative effects could plausibly occur with the proposed Ballinlee Wind Farm, substation and grid connection development. It was concluded that due to considerable intervening distance between the proposed development and other planned and existing wind farm developments, no cumulative shadow flicker effects are possible, and therefore determined that the cumulative impact on human health and wellbeing from shadow flicker will be **imperceptible**.

5.5 Mitigation Measures and Monitoring.

5.5.1 Mitigation Measures

The potential for significant effects on the human environment will principally arise during the construction phase from traffic, and noise and dust effects. Specific mitigation in relation to these elements are outlined in the respective Chapters of **Volume II** of this EIAR:

- **Chapter 10** Air Quality regarding mitigation measures to reduce impact on air quality;
- **Chapter 11** Climate regarding mitigation to reduce impact on climate;
- **Chapter 13** Noise and Vibration regarding mitigation associated with noise and vibration;
- **Chapter 15** Shadow Flicker regarding potential impact from the generation of shadow flicker;
- **Chapter 16** Material Assets Traffic and Transport regarding management of traffic related to the proposed development, and;
- **Chapter 17** Material Assets Built Services with regard to effects on existing services in the area.

A **Construction and Environmental Management Plan (CEMP)** (EIAR **Volume III, Appendix 2A**) has been prepared for the proposed development and will be implemented for the construction phase to minimise effects on the human environment. No additional mitigation measures for population and human health impacts are proposed in this Chapter. Mitigation measures from the **CEMP** have been added to the relevant topics below.

Public Safety

While there is the potential for construction-related hazards, serious risks to human health and safety are not envisaged. During construction, the site will be managed in accordance with the following safety and health

regulations and guidelines which will ensure a high standard of safety both for workers on site and the general public:

- Safety, Health & Welfare at Work (Construction) Regulations 2013 as amended;
- Safety, Health & Welfare at Work Act 2005 as amended;
- Safety, Health & Welfare at Work (General Applications) Regulations 2007 as amended; and
- Irish Wind Energy Association (IWEA) Best Practice Guidelines 2012.

A Safety and Health Plan covering all aspects of the construction process will be prepared in advance of construction and will comprehensively deal with safety and health related issues.

Traffic and Road Usage

Potential impacts on the surrounding road network will arise principally during the construction phase, with peak traffic occurring during the 24-month construction programme. Impacts will therefore be temporary in nature. Peak heavy vehicle traffic volumes generated by the delivery of construction materials is predicted to be up to 142 heavy vehicles per day, both to and from the site (**Volume II, Chapter 16** Material Assessments – Traffic and Transportation of this EIAR). Other deliveries to site will be curtailed or stopped during concrete pours. Highest peak hour heavy vehicle traffic volumes from deliveries and employees will be up to 194 vehicles, both to and from the site.

A traffic impact assessment carried out for the proposed development indicates that while the increased traffic volume on the local road network during the construction phase would be substantial, this increase will be well within the carrying capacity of the local road network and will be of short duration. However, the existence of additional traffic, especially heavy goods vehicle traffic, associated with the construction phase has the potential for local residents and users of these roadways to experience minor disturbances and/or be inconvenienced on encountering site related traffic. The traffic impact assessment included in **Volume II, Chapter 16** Material Assets – Traffic and Transportation of this EIAR sets out that construction traffic will occur outside the peak morning and evening peak commuter traffic and that any construction phase impacts would be temporary, requiring no road closures. The grid connection construction works between the proposed windfarm site and substation, along the L1219, will require a stop/go alternating direction traffic management arrangement. This will result in short period waiting and delays for traffic during the proposed working hours.

The Appointed Contractor(s) will prepare a detailed Traffic Management Plan prior to the works commencing. This Plan will be finalised in agreement with An Garda Síochána and Limerick City & County Council.

The plan will include provision for:

- Communicating with the community, An Garda Síochána and Limerick City & County Council.
- Details of site access and any site traffic rules, including security, parking, loading and unloading, required speed or other relevant details.
- Details of the turbine component delivery and any road closures.
- Programme of maintenance and upkeep of public roads.
- Site operating hours (including delivery) to be outlined.
- In order to mitigate from a significant impact during peak traffic hours, the majority of staff will either arrive on-site before or after the peak morning traffic and finish work before or after the evening peak traffic hours.

- The condition of the public roads will be monitored on an on-going basis and a road sweeper provided to clean the public roads if required.
- There will be no parking of any vehicles on the public road near the wind farm site entrance.
- Adequate parking will be provided on site for both employees and visitors.
- The condition of the site entrances will be monitored on an on-going basis and a road sweeper provided to clean the public road if required.

A Construction-phase Traffic Management Plan has been prepared for the proposed development and will be implemented during construction to address traffic issues (EIAR **Volume III, Appendix 16A**).

Noise

The construction phase has the potential to generate noise emissions which could cause disturbance to local noise sensitive receptors. The construction noise impact assessment included in **Volume II, Chapter 13** Noise and Vibration of this EIAR found that noise generated during the construction phase of this development will be slight and will not exceed the acceptable construction noise limit (70dBA) at any dwelling location, for the duration of the construction phase.

The noise assessment makes recommendations regarding measures of reducing the amount of noise reaching the noise sensitive receptors in accordance with *BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise*. Best practice will be employed at all times to minimise noise emissions from the construction site. These include:

- Only sound plant/equipment will be permitted on site.
- No unnecessary revving of machinery on site.
- Plant will be properly used and regularly maintained.
- Compressors, if needed, will be ‘sound related’ models fitted with properly lined and sealed acoustic covers which will be kept closed whenever machines are in use.
- All vehicles and mechanical plant will be fitted with effective exhaust silencers.

Noise criteria were derived in accordance with the Irish Wind Energy Development Guidelines (2006), and predicted operational noise levels are not expected to exceed these criteria. Therefore, no specific mitigation measures are therefore required however, in the event of a noise exceedance or complaint, an option to mitigate using a curtailment programme is available. Furthermore, if the proposed development is permitted and constructed, a post-commissioning noise survey with the wind turbines operating will be carried out and any exceedances of the planning conditions which can be attributed to the Wind Farm will be mitigated by curtailment.

The assessment for noise impact from the substation and associated works demonstrated that there is no likely significant effect with respect to noise, therefore no mitigation measures are required.

Dust

It is generally accepted that the proposed development will make a positive contribution to air quality once operational. Notwithstanding this, there is the potential for short-term adverse impacts in terms of dust emissions during the construction phase of the development.

Vehicle and fugitive dust emissions would occur primarily during construction. Dust generated during the construction phase is not likely to significantly affect the local air quality. Dust levels are not expected to exceed the recommended TA Luft 350mg/m³/day guideline limit. There is, however, the possibility of dust occurring in

the vicinity of the site entrance and along the local public roads which could affect road user health and visibility. This is considered a **temporary, slight** and **adverse** effect and mitigation will be implemented.

In order to ensure that no dust disturbance occurs, a series of measures will be implemented:

- Site access tracks will be regularly cleaned and maintained as appropriate.
- Hard surface roads will be swept to remove mud and aggregate materials from their surface.
- Furthermore, any road/track that has the potential to give rise to fugitive dust will be regularly watered, as appropriate, during dry and/or windy conditions.
- Speeds will be restricted on hard surfaced roads as site management dictates.
- Public roads in the vicinity of the site will be regularly inspected for cleanliness and cleaned as necessary.
- A temporary vehicle wheel wash facility will be installed in proximity to the site entrance.

The dust minimisation plan will be reviewed at regular intervals during the construction phase to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures. With the effective implementation of standard dust management measures to control and reduce dust, **no significant adverse impact**, in terms of a community disturbance at nearby houses and other buildings near the site, **is likely to occur**.

Shadow Flicker

Shadow Flicker Control Modules (SFCM) are a standard element of commercial wind turbine packages which requires the identified dates and times of day of potential occurrence of shadow flicker at dwellings within the shadow flicker study area to be inserted into the SFCM computer program. This software considers factors such as weather conditions, which will then automatically stop each wind turbine at times when shadow flicker could otherwise occur within any of the houses within the study area. Once the conditions for shadow flicker to occur no longer apply (e.g. when the sun has passed the relevant position in the sky or once it has been clouded over), the wind turbine is restarted.

The shadow flicker computer model assessment provides very detailed information, down to the exact times of day when shadow flicker is predicted to occur and from which turbine for each receptor. This information will be used to program the shadow flicker modules to eliminate shadow flicker at receptors making sure it does not occur at any receptor.

Following the implementation of this mitigation, the proposed development will be fully compliant with the 2006 and draft 2019 WEDGs, and no residual significant effects on human health or population are expected.

5.5.2 Monitoring

As with mitigation, monitoring is prescribed in relevant Chapters of this EIAR where required. No additional monitoring is proposed here for those particular aspects.

5.6 Residual Effects

With the mitigation measures in place, no significant adverse residual effects on the human environment will occur in relation to dust, traffic, noise and shadow flicker as a result of the following:

- With the installation of wind turbines applying the latest technology and the implementation of mitigation measures, noise disturbances will be kept to a minimum and within acceptable noise limits;

- With natural meteorological conditions and the presence of screening, together with shadow flicker analysis and with the implementation of mitigation measures if necessary, shadow flicker effects will be kept to a minimum and within the guide limits on the number of exposure hours per year, with no shadow flicker at receptors;
- With the implementation of standard traffic management measures, traffic disturbances will be kept to a minimum;
- With the implementation of mitigation measures, significant health and safety implications are not envisaged; and
- With the implementation of standard best management construction activities, dust levels will remain within recommended acceptable guide-limits.

Considering the other assessment topics, no significant residual effects are envisaged. The identified effects are:

- There are no significant residual effects envisaged for population and settlement patterns. Some higher level personnel that relocate to the area during construction may stay, but this is considered imperceptible.
- While employment and economic activity will reduce upon the completion of the proposed development, there is potential for those locally sourced to work during the construction phase to further utilise the skills acquired working on similar developments in the area or engage in roles required during the operational phase of the proposed development for maintenance works if required. This residual effect is considered positive and slight.
- Land Use will see a small residual effect in the loss of land for the foundation, hardstands and access tracks for the proposed development. This will not affect any right-of-way in the area and are not considered to significantly impact agricultural activity in the area. The residual effect of land use is considered imperceptible.
- There will be a visual residual impact on tourism and amenities in the area regarding the proposed development. The turbines are large and therefore can have a long-term residual effect in the area.

Overall, there will be no significant residual effects on population and human health as a result of the proposed development.

5.7 Conclusion

This chapter has assessed the potential effects on population and human health on the proposed development, and it is not anticipated to have any significant effects on population and settlement patterns, economic activity and employment, tourism and amenities, land use and human health and wellbeing.

The assessment considered the existing baseline environmental conditions of the proposed development which included the demographics and socio-economics in the electoral divisions. In addition, potential effects during the construction phases, operational phase and decommissioning phase were considered as well as cumulative and residual effects. Finally, where effects were unavoidable but manageable, mitigation measures are to be implemented where relevant.

Regarding the local population and settlement patterns, no significant impacts are considered to occur due to the proposed development. Personnel will be recruited from the local area where possible for construction, operation and decommissioning phases. There may be some experienced employees that may temporarily relocate during the lifespan of the proposed development relevant to their experience, but this impact is negligible, and overall no adverse effects are associated with the proposed development regarding population and settlement patterns.

As outlined previously regarding employment, workers needed for the construction phase of the proposed development will be sourced locally, having a direct and positive impact in the area. Indirect positive impacts during the construction and decommissioning phase will affect the smaller towns, with an increase in business, particularly for food and beverage operators being utilised by construction personnel.

The proposed development has been designed to keep land take to a minimal, reducing the impact on land use in the vicinity, and no adverse effects are considered in relation to land use and social considerations related to the proposed development. There will be no severance, loss of rights of way or amenities as a result of the proposed development.

Health and Safety guidelines will be followed throughout construction to ensure no serious accidents occur. There is no public access available to the area of the proposed development, and it will be closed to the public throughout its lifespan. Shadow flicker impacts during the operation phase have also been considered with the potential effect on nearby sensitive receptors, and it was concluded that there are likely to be no significant impacts on human health and safety related to the proposed development. A similar conclusion can be considered for Climate, as the project over its lifespan will offset approximately 2.5 million tonnes of CO₂ and is considered to also have a positive effect on climate overall.

It was concluded that while there would be no adverse impact directly on tourism infrastructure in the vicinity of the proposed development, there is potential for the turbines to be visible from tourist infrastructure during operation due to their size. This indirect impact is long-term and of slight significance on the receiving environment.

Disturbances associated with the additional volumes of traffic will principally be confined to the construction phase and will cease on completion of works. The construction phase will be managed to minimise the impact on the human environment and the local residents. With the mitigation measures in place, no significant adverse effects on the local human environment are expected.

Cumulative effects were considered in relation to proposed, consented and constructed projects located nearby the proposed development. No significant in-combination impacts were identified in relation to population and human health.

Once mitigation measures set out throughout this EIAR are implemented, it is unlikely that significant adverse impacts to population and human health will occur as a result of the proposed development. This is also similar to residual effects, with no significant residual effects to population and human health associated with the proposed development.

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