

MWP

Chapter 05 Population and Human Health

Ballycar Wind Farm

5. Population and Human Health

5.1 Introduction

This chapter considers the potential significant effects on population and human health arising from the proposed development, a 12-turbine wind energy development in County Clare. A full description of the proposed development, development lands and all associated project elements is provided in **Chapter 2 Description of the Proposed Development** of this **EIAR**. The nature and probability of effects on population and human health arising from the overall project has been assessed. The assessment comprises:

- a review of the existing receiving environment;
- prediction and characterisation of likely effects;
- evaluation of effects significance;
- consideration of mitigation measures, where appropriate.

One of the principal concerns in the development process is that individuals or communities, should experience no significant diminution in their quality of life from the direct or indirect effects arising from the construction, operation and decommissioning of a development. Ultimately, all the impacts of a development impinge on human health, directly and indirectly, neutral, positively and negatively. The World Health Organisation (WHO) defines health as:

‘Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity’.

This chapter considers the potential significant effects on population and human health arising from the proposed development.

5.1.1 Competency of Assessor

The assessment study was undertaken, and this report was prepared by Kieran Barry BEng, PgDip. MIEEnvSc. Kieran is an experienced Environmental Scientist. Kieran works on a variety of infrastructure projects conducting environmental assessments and supporting the delivery of Environmental Impact Assessment (EIA) Screening Reports, feasibility and constraints studies, route option assessments and Environmental Impact Assessment Reports (**EIAR**).

This assessment has been reviewed by Olivia Holmes. Olivia is a Chartered Engineer and Chartered Environmental Practitioner with over twenty years’ experience in Environmental Engineering focussing primarily on Environmental Impact Assessment (EIA), Appropriate Assessment (AA) and planning. She has prepared and reviewed a number of chapters for EIARs over her career for a broad range of projects.

5.1.2 Legislation and Guidelines

The following legislation and published guidance has been consulted in undertaking this assessment:

- 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”);
- EPA, Guidelines on Information to be contained in environmental impact assessment reports’, May 2022;
- EU (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018);

- 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.

The Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022) state that:

‘..in an EIAR, the assessment of impacts on population and human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in the EIAR e.g. under the environmental factors of air, water, soil etc.’

Recital 22 to the EIA Directive provides that “In order to ensure a high level of protection of the environment and human health, screening procedures and environmental impact assessments should take account of the impact of the whole project in question, including, where relevant, its subsurface and underground, during the construction, operational and, where relevant, demolition phases”.

The 2022 EPA Guidelines recommend considering the following issues when assessing the potential impacts and effects of a proposed development on Population and Human Health;

- Employment;
- Settlement Patterns;
- Land use patterns;
- Baseline population;
- Human health (considered with reference to other headings, such as water and air);
- Amenity (e.g. effects on amenity uses of a site or of other areas in the vicinity may be addressed under the factor of Landscape).

5.2 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. The desk study included the following activities:

- Review of the most recent Central Statistics Office (CSO) Census of Ireland data to establish settlement demographics and economic context of the study area.
- 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 Clare County Council’s Planning Register to identify relevant development proposals currently under consideration by the Council.
- 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.

The desk-based research also had regard to published information on public health and wind turbines including:

- Irish Health Service Executive (HSE) *Position Paper on Wind Turbines and Public Health* (2017).
- World Health Organisation (WHO) Regional Office for Europe, *Night Noise Guidelines for Europe*, (2009).

- *Health Impacts of Wind Turbine Noise*. The Public Health Wales Position Statement (2013).
- Australian Government National Health and Medical Research Council (NHMRC) Statement: *Evidence on Wind Farms and Human Health* (2015).
- *The Potential Health Impact of Wind Turbines*. Chief Medical Officer of Health (CMOH) Report (Ontario) (2010).
- *Wind Turbine Health Impact Study: Report of Independent Expert Panel*. Prepared for: Massachusetts Department of Environmental Protection, Massachusetts Department of Public Health (January 2012).
- WHO *Environmental Noise Guidelines for the European Region* (2018).
- ESB *EMF and You Information about Electric and Magnetic Fields and the Electricity Network in Ireland* (April 2017).
- European Commission Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) *Opinion on Potential Health Effects of Exposure to Electromagnetic Fields (EMF)* (2015).

Site visits were conducted to ascertain the land uses and the location of residential dwellings in the surrounding area.

5.2.1 Public Consultation

For the purposes of public engagement and consultation, Ballycar Green Energy Ltd. set up a dedicated project website www.ballycargreenenergy.ie. Activities of public engagement carried out so far are detailed in **Section 1.4.2.4** of this EIAR, refer to **Table 1-1**.

The consultation enabled the public to examine many aspects of the project in detail and then revert to the project team with any questions, comments, or suggestions. Refer to the Community Report in **Volume III, Appendix 1A**.

5.2.2 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 site. These comprises those who reside, work, visit, or use the local road networks. Electoral Divisions (EDs) are the smallest legally defined administrative areas in the State for which Small Area Population Statistics (SAPS) are published from the Census of Population. Therefore, in order to discuss the receiving human environment and other statistics in the vicinity of the proposed development site, the Study Area for this assessment has regard to Electoral Divisions (EDs) within or located close to the proposed development site (Areas referenced 1-7 in **Figure 5-1**). The extent of the EDs and SAPS considered for the purposes of this assessment are shown in **Figures 5-1** and **5-2** and set out in **Tables 5-1** and **5-2**.

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;

- Landscape and Visual Effect (**Chapter 12**);
- Cultural Heritage Effect (**Chapter 13**); and
- Material Assets Effect (including Traffic and Transportation, Telecommunications and Aviation) (**Chapter 15**).

There is a requirement to replant land taken out of forestry to facilitate the wind farm infrastructure. This replanting will be carried out in line with the required licensing and approval procedures and not within an area so as to result in any cumulative effects.

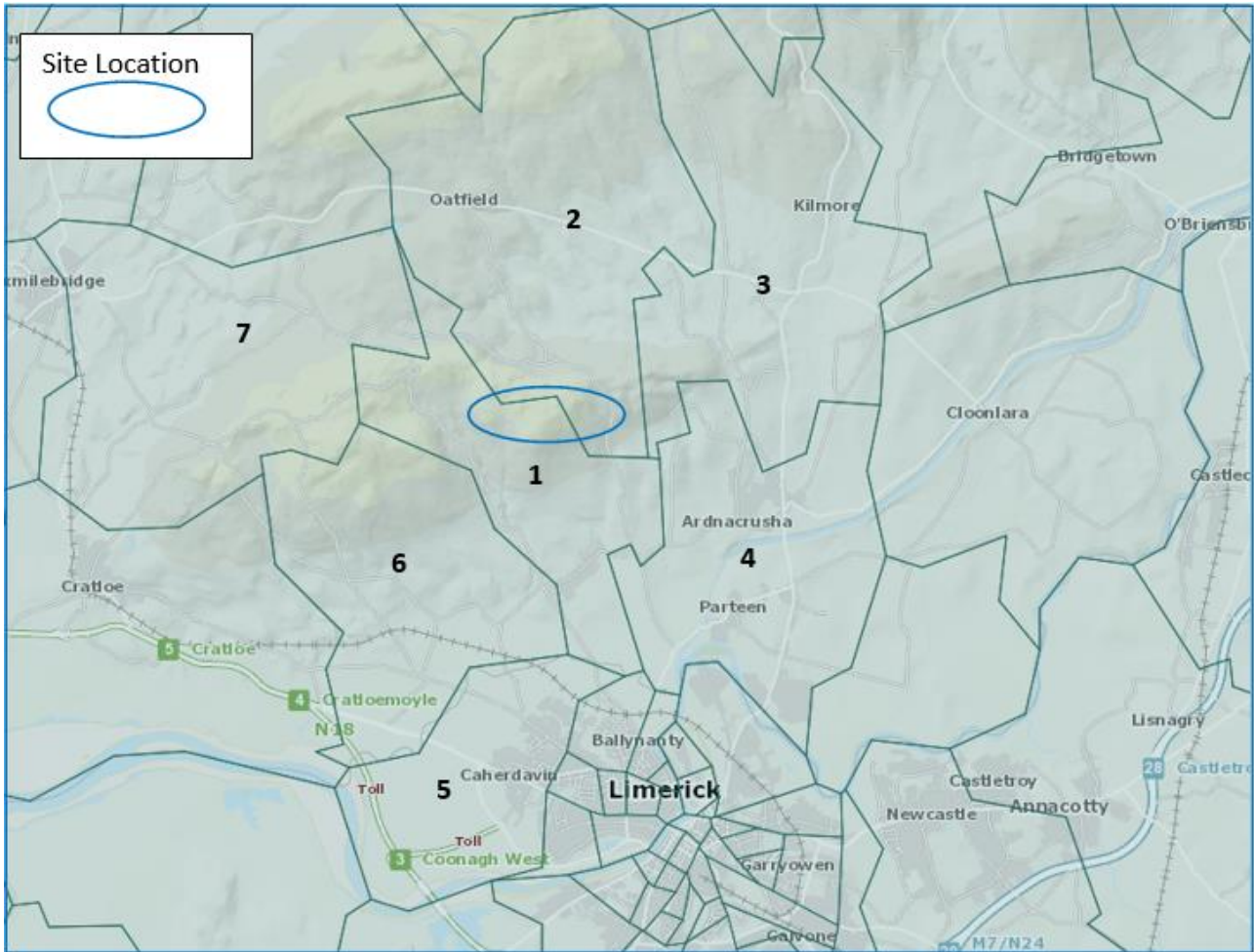


Figure 5-1: Study Area Electoral Divisions (EDs)

Table 5-1: Study Area Electoral Divisions (EDs) List

Area Ref	Electoral Division
1	Ballycannon, Clare
2	Cloontra, Clare
3	Cloghera, Clare
4	Ballyglass, Clare
5	Limerick North Rural, Limerick City and County
6	Killeely, Clare
7	Mountievers, Clare

Area Ref	Electoral Division	CSO Small Area
5A	SA127105001	Limerick North Rural, Limerick City and County
5B	SA127105020	
5C	SA 127105028/127105031	
6A	SA037085002	Killeely, Clare
6B	SA037085001	
7	SA037120001	Mountievers, Clare

5.2.3 Scope of Assessment

Table 5-3 outlines the issues which the EPA guidance documents suggest may be examined as part of the human environment study.

Table 5-3: Issues relevant to the Human Environment

Topic Area
Employment
Settlement Patterns
Land-use Patterns
Baseline Population
Human health (considered with reference to other headings, such as water and air)
Amenity (e.g effects on amenity uses of a site or of other areas in the vicinity may be addressed under the factor of Landscape)

Accordingly, the scope of this assessment is made with respect to these topic areas and considers the effects of the construction, operation and decommissioning of the proposed development in terms of how the proposal could affect population and settlement, economic activity, employment, land use, amenities and tourism, and health and safety.

5.2.3.1 Human Health

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

The EPA (2022) guidance also advises that ‘The evaluation of effects on these pathways is carried out by reference to accepted standards (usually international) of safety in dose, exposure and risk. These standards are in turn based upon medical and scientific investigation of direct effects on health of the individual substances, effect or risk. This practice of reliance upon limits doses and thresholds for environmental pathways such as air water or soil provides a robust and reliable health protection criteria for analysis relating to the environment’.

Human health, in this chapter of the **EIAR**, is therefore considered in relation to health effects/issues and environmental hazards arising from the other environmental factors and the assessment is made with regard to the established international health-based guidelines limit value necessary to protect the public.

The potential wellbeing and disturbance effects of the proposed project on the local human environment have been identified as follows:

- Dust emissions from construction activities;
- Noise emissions during construction activities and operation;
- Public safety;
- Visual effects during operation;
- Shadow flicker during operation;
- Traffic disturbance during construction;
- Interference with telecommunication signals during operation.

Each of these issues have been fully assessed and are documented in other chapters of the **EIAR** as set out in **Table 5-4**. These assessments were reviewed to inform this study.

Table 5-4: Disturbance and Health and Safety issues and relevant assessment

Development Phase	Potential Disturbance/ Health & Safety Issue	Addressed in EIAR Chapter
Construction Phase	Noise emissions and vibration	Chapter 10 Noise
	Dust emissions	Chapter 14 Air and Climate
	Public safety	Chapter 2 Description of the Proposed Development
	Traffic disturbance	Chapter 15 and Appendix 15C Traffic and Transport Assessment
Operational Phase	Noise emissions and vibration	Chapter 10 Noise
	Visual effects	Chapter 12 Landscape
	Air quality effects	Chapter 14 Air and Climate
	Shadow Flicker disturbance	Chapter 11 Shadow Flicker
	Telecommunications interference	Chapter 15 Material Assets
	Public safety	Chapter 2 Description of the Proposed Development
Decommissioning	Traffic disturbance	Chapter 15 Material Assets
	Noise emissions and vibration	Chapter 10 Noise

Tourism and amenity effects are interrelated with effects on landscape and visual amenity, archaeology and heritage interests, and transport. Each of these effects are addressed in other chapters of this Environmental Impact Assessment Report (**EIAR**) and reference should therefore be made to **Chapter 12 Landscape**, **Chapter 13 Cultural Heritage** and **Chapter 15 Material Assets**.

While reference is made to these effects where relevant, this chapter does not re-evaluate these assessments. The focus of this assessment is primarily on physical disruption, severance, or exclusion of users' ability to continue existing activities or deterrence of additional further development of amenities and tourism potential.

5.2.3.2 Assessment Criteria

Determination of the significance of an effect will be made in accordance with the terminology outlined in EPA *Guidelines on the information to be contained in Environmental Impact Assessment Reports (2022)*. This assessment criteria is set out below.

Table 5-5: Assessment Criteria

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.
	Negative/ adverse	A change which reduces the quality of the environment.
Significance of Effects	Imperceptible	An effect capable of measurement but without noticeable consequences.
	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 (no direct impact).
	Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends (change is noticeable but reversible – site / feature can be integrated into development).
	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. Mitigation would be unlikely to remove adverse effects.
Extent and Context of Effects	Extent	Describe the size of the area, the number of sites and the proportion of a population affected by an effect.
	Context	Describe whether the extent, duration or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)
Probability of Effects	Likely Effects	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
	Unlikely Effects	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.

Duration and frequency of Effects	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.
	Long-term	Effects lasting fifteen to sixty years.
	Permanent	Effects lasting over sixty years.
	Reversible	Effects that 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 (a.k.a. Secondary or Off-site Effects)	Impacts which are not a direct result of the project.
	Direct	For example where an archaeological / heritage feature / site is physically located within the footprint of a proposed development whereby the removal of part or all of the feature or site is thus required.
	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 been implemented.
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).	

5.3 Baseline Environment

5.3.1 Site Location and Description

The proposed development is situated in a rural area of southeast Clare on the east of Woodcock Hill and approximately 2.5km northwest of Ardnacrusha power station, 3km northwest of Limerick City and Suburbs and 6.7km southeast of Sixmilebridge (see **Figure 5-1** of this Chapter).

The proposed wind farm site is located within the townlands of Glennagross, Cappateemore East, Ballycannon West, Ballycannon East, Ballycar South, Ballycar North and consists of coniferous forests, transitional woodland scrub and agricultural land.

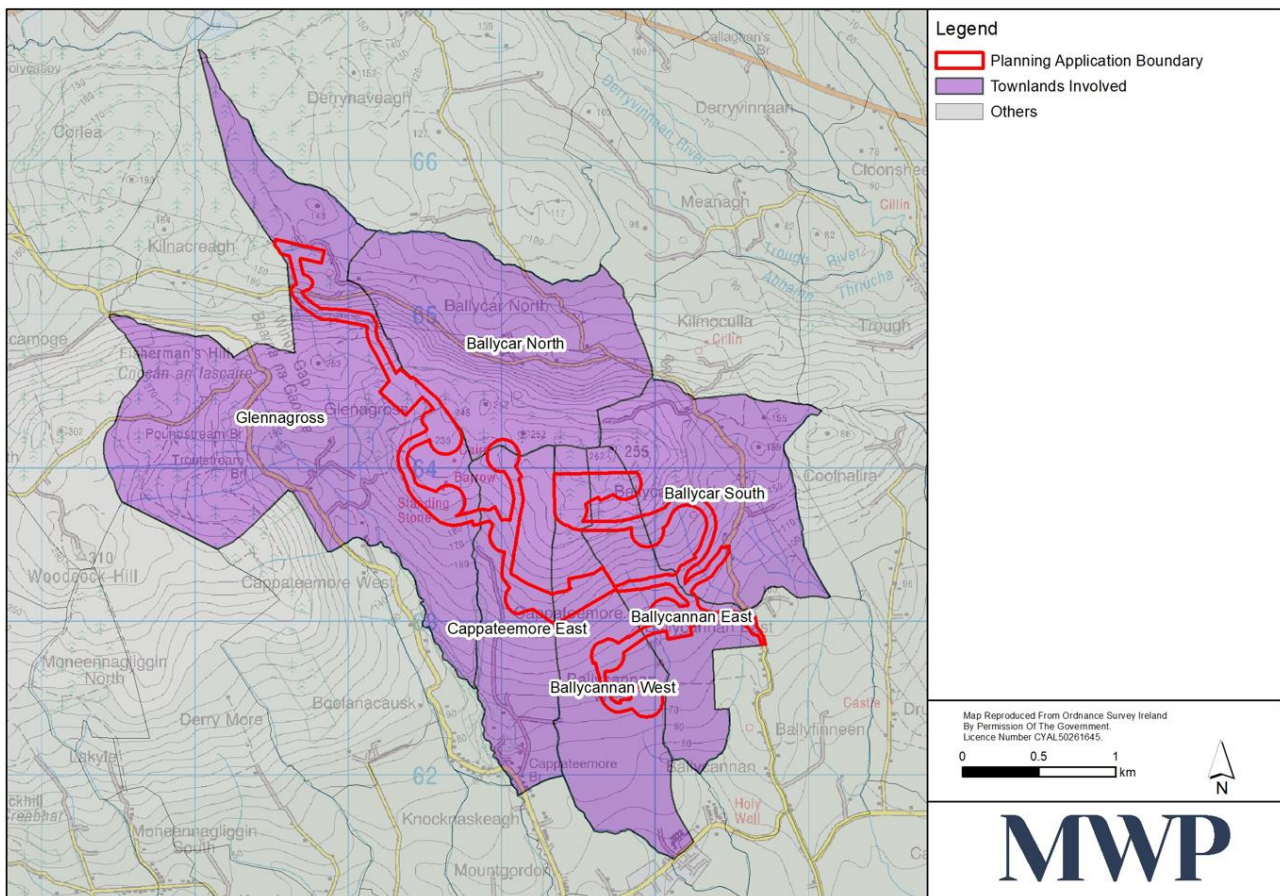


Figure 5-3: Development Lands Townlands

In addition to the proposed development as described, there is a proposed underground connection between T1 and the proposed 110kV substation which will be located northwest of T1. The underground connection from T1 is routed along existing forestry tracks and through conifer forestry to the north west of the wind farm site and connects to the proposed 110kV substation. From the proposed 110kV substation, an underground cable is routed in a north west direction where it connects to the existing 110 kV overhead line. The proposed 110kV grid route is approximately 1.5km in length. 1.0km of the 110kV grid route is proposed within existing forestry tracks. The remaining 0.5km is routed through conifer forestry. It also crosses a 3m wide local public road. On private lands, a new unbound stone access track will be constructed over the 110kV grid route to allow access for future maintenance.

5.3.2 Settlement Patterns

Settlement patterns in the greater region range from small to medium community settlements and relatively isolated farmsteads.

Limerick City and Suburbs (population 102,287, CSO 2022) which is approximately 3km to the southeast is the largest urban centre relative to the site of the proposed development and is a major service and employment centre in the region. Smaller population centres in the general locality are the towns and villages of Ardnacrusha, Meelick, Parteen, Cratloe and Sixmilebridge. These towns and small villages provide a range of local community facilities, including primary schools, sporting clubs, churches, general shops, and post offices.

The nearest settlements to the proposed development are shown in **Figure 5-4**.

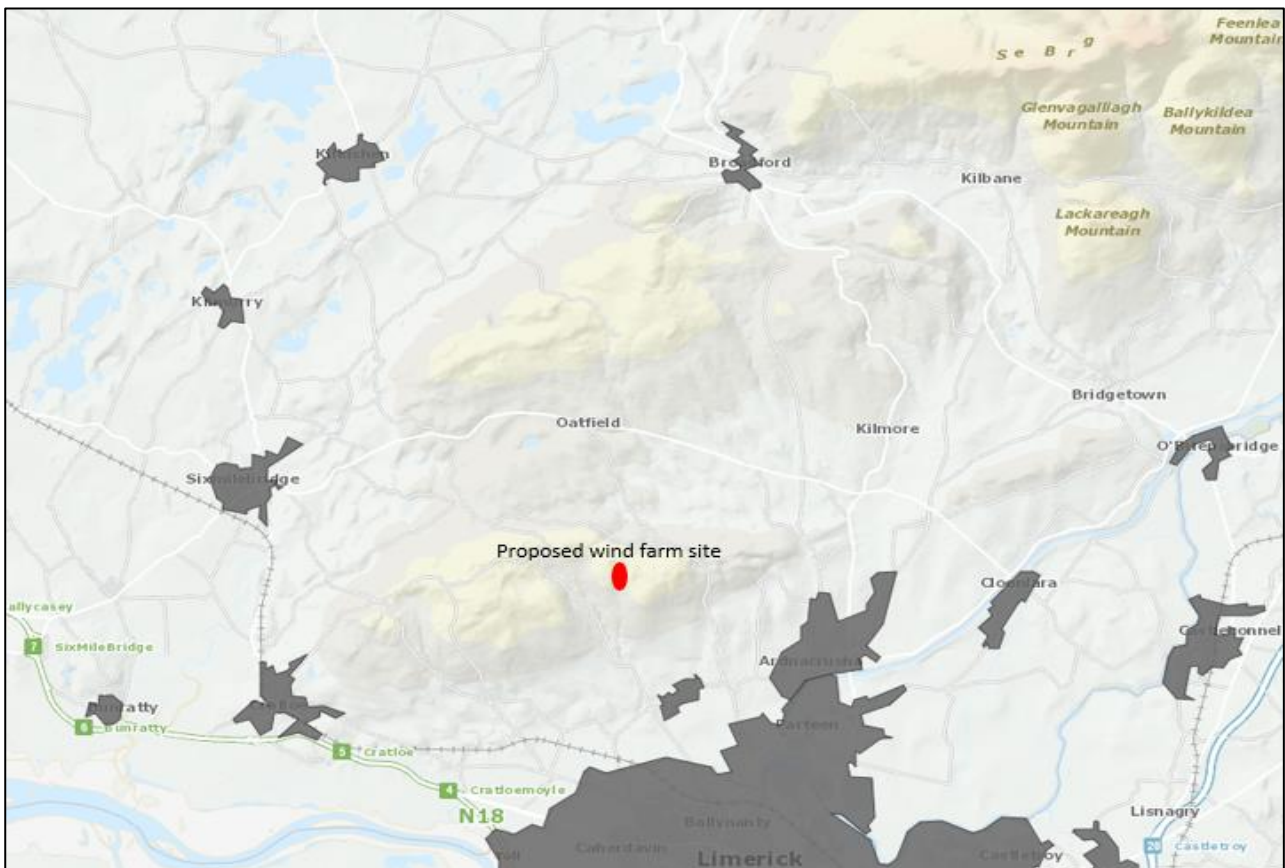


Figure 5-4: Principal Towns/villages in the Area

The proposed development lands extend across part of the rural townlands of Glennagross, Cappateemore East, Ballycannon West, Ballycannon East, Ballycar South and Ballycar North. This is a rural but moderately populated area with settlement patterns typically comprised of a mixture of one-off housing and minor ribbon development distributed along the local and regional road networks that encompass the site and serve the area. Housing and settlement located in the vicinity of the proposed development lands is shown in **Figure 5-5**. The greatest density of settlement occurs along local road networks surrounding the proposed development area and appears in clustered and ribbon development.

There are no residential dwellings within the proposed development site boundary. The existing Wind Energy Development Guidelines published in 2006 do not have a prescribed setback distance but do indicate that a 500m setback

distance should be sufficient to prevent any significant noise impact arising from the operations of wind turbines. **Figure 5-5** shows settlement in the wider context of proposed development. Within 2km of the nearest wind turbine, there are approximately 303 dwellings which are concentrated to the south of the site in the village of Meelick, as shown in **Figure 5-5**.

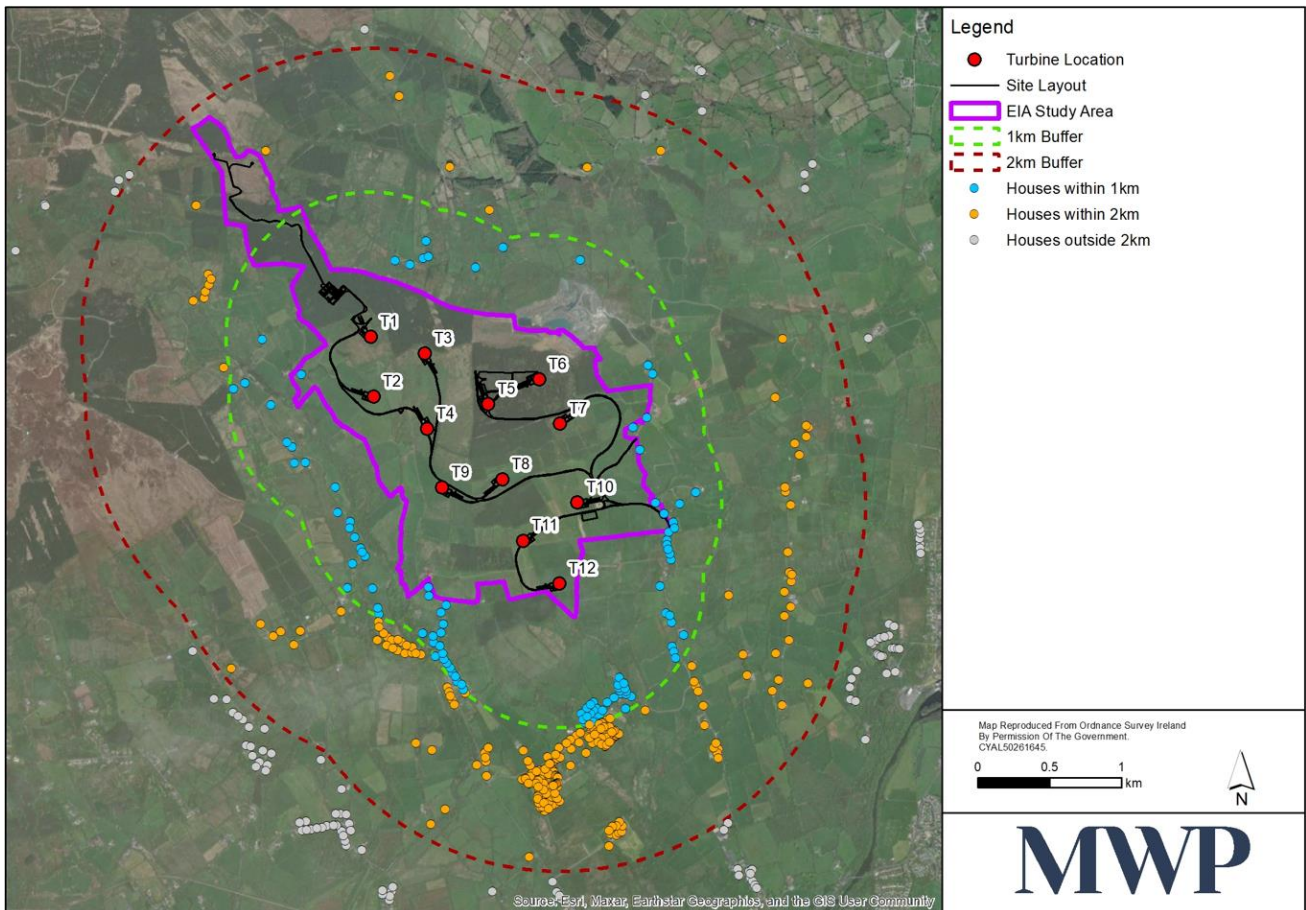


Figure 5-5: Residential Dwellings within 1-2km of the wind turbines

5.3.3 Population Density

The 2022 Census of Population provides population statistics for small geographical areas, as well as electoral divisions. A review of this data shows that while the recorded population density across the study area varies between the small geographical areas, the overall region is moderately populated. Population densities increase in the small areas which are closer to Limerick City, as illustrated in **Table 5-6**.

Table 5-6: Small Area Population Statistics

	CSO Small Area	Electoral Division	Total Population
1A	A037006002		412
1B	A037006003/SA037006004	Ballycannan, Clare	343
1C	A037006001		286
2	A037036001	Cloontra, Clare	307
3A	A037029001		285
3B	A037029002	Cloghera, Clare	301
4	A037009004/01	Ballyglass, Clare	104
5A	A127105001		374
5B	A127105020	Limerick North Rural, Limerick City and County	356
6A	A037085002		374
6B	A037085001	Killeely, Clare	526
7	A037120001	Mountievers, Clare	334

In addition to the latest CSO 2022 data on population and residents, the CSO has also started documenting arrivals from Ukraine in Ireland. The latest CSO published data on Ukrainian arrivals from 24th October 2023 stated that there have been 96,338 arrivals from Ukraine in Ireland by 8th October 2023. Of the 96,338 arrivals, there have been 360 arrivals in the municipal district of Killaloe, County Clare, where the proposed development is located.

5.3.4 Population Trends

The available data on population trends for the period 2016-2022 indicates that most of the Electoral Divisions, shown in **Figure 5-1** of **Section 5.2.3**, experienced increases in population numbers, except for Cloghera (-1%) and Ballycannan (-10.7%) which had population declines, refer to **Table 5-7**. Census 2022 shows that the population of Clare grew by 8%, which is in line with the 8% growth in the overall population of Ireland.

Table 5-7: Population Trends

Area Ref	Electoral Division	2016 Population	2022 Population	% Change in Population 2016-2022
1	Ballycannan, Clare	1166	1041	-10.7
2	Cloontra, Clare	270	307	+13.7
3	Cloghera, Clare	592	586	-1

Area Ref	Electoral Division	2016 Population	2022 Population	% Change in Population 2016-2022
4	Ballyglass, Clare	5994	6030	+2.29
5	Limerick North Rural, Limerick City and County	6801	7364	+8.3
6	Killeely, Clare	793	900	+13.5
7	Mountievers, Clare	1281	1410	+10.1

5.3.5 Public Health

The 2022 Census provided information on the general health profile of the population for each small area. The statistics show that, overall, the local population has 'good' or 'very good' health with only between 1-5% of the proportion of the population in the Study Area reporting to have 'bad' or 'very bad' health. See **Table 5-8**.

Table 5-8: Health Statistics 2022 - % Population Bad or Very Bad – Health

Area Ref	CSO Small Area	ELECTORAL DIVISION	TOTAL POPULATION	% Good to Very Good Health	% Bad to Very Bad Health
1A	A037006002	Ballycannan, Clare	412	88.1	1.5
1B	A037006003/SA037006004		343	72.3	4.4
1C	A037006001		286	84.6	1
2	A037036001	Cloontra, Clare	307	90.9	2
3A	A037029001	Cloghera, Clare	285	90.1	1.4
3B	A037029002		301	91	0
4	A037009004/01	Ballyglass, Clare	104	93.3	0
5A	A127105001	Limerick North Rural, Limerick City and County	374	80.2	2.4
5B	A127105020		356	89	2.5
6A	A037085002	Killeely, Clare	374	88.5	1.3
6B	A037085001		526	81.6	1.3

Area Ref	CSO Small Area	ELECTORAL DIVISION	TOTAL POPULATION	% Good to Very Good Health	% Bad to Very Bad Health
7	A037120001	Mountievers, Clare	334	85.6	1.8

The emergence of the Covid-19 virus in Ireland in the early part of 2020 presented a new human health risk and concern amongst the general public across Ireland including the area of the proposed development and surrounds. Currently, there are no Covid-19 restrictions in place and the introduction of vaccines have helped society gravitate towards living with Covid-19. The medium to long term effects of the virus on national and local human health, however, is not currently fully known.

5.3.6 Economic Activity

According to the 2022 Census employment statistics for the region, the work force is employed in a diverse range of industries, refer to **Table 5-9**. The statistics show that the highest level of employment is within the Public administration/professional services category with approximately 34% of the workforce within the Study Area employed in this category. Other key employment sectors include Commerce and Trade (20%), Manufacturing (17%), and Transport and Communication (9%). Smaller sectors within the Study Area consist of Building and construction and Agriculture, forestry and fishing.

The 2022 commuter flow data, refer to **Table 5-10**, suggests that most workers (79%) are travelling by private vehicles whereas 3% of workers travel via public transport, 4% of workers cycle or walk to work and 10% work from home.

Table 5-9: Workers by Industry

Area Ref	Small Area Code	Electoral Division	% Workers						
			Agriculture, forestry, fishing	Building and construction	Manufacturing industries	Commerce and trade	Transport/Communication	Public admin/Professional Services	Other
1A	A037006002	Ballycannon, Clare	4	7	10	26	10	25	17
1B	A037006003/ A037006004		0	6	10	17	15	32	20
1C	A037006001		1	4	17	18	15	32	15
2	A037036001	Cloontra, Clare	12	4	14	20	7	34	8
3A	A037029001	Cloghera, Clare	14	4	21	14	8	40	10
3B	A037029002		4	3	22	20	7	39	6
4A	A037009004/01	Ballyglass, Clare	9	2	9	24	4	46	7
5A	A127105001	Limerick North Rural,	3	3	15	22	10	33	15
5B	A127105020	Limerick City and County	0	6	20	25	9	27	14
6A	A037085002	Killeely, Clare	4	5	22	20	7	41	11
6B	A037085001		0	5	17	17	6	38	17
7	A037120001	Mountievers, Clare	4	9	21	16	10	33	7
Overall Study Area			5	5	17	20	9	35	12

Table 5-10: Workers Commuting

Area Ref	Small Area Code	Electoral Division	% Workers				
			On Foot/Bicycle	Public Transport (Bus, Train, Dart/Luas)	Motor Vehicle	Work mainly at or from home	Not stated
1A	A037006002	Ballycannon, Clare	5	15	72	7	6
1B	A037006003/ A037006004		2	3	82	6	8
1C	A037006001		1	2	86	6	5
2	A037036001	Cloontra, Clare	3	0	83	12	2
3A	A037029001	Cloghera, Clare	1	0	85	10	5
3B	A037029002		3	1	82	11	4
4	A037009004/01	Ballyglass, Clare	7	0	78	15	0
5A	A127105001	Limerick North Rural, Limerick City and County	4	3	71	16	6
5B	A127105020		9	2	74	9	6
6A	A037085002	Killeely, Clare	4	1	77	13	4
6B	A037085001		6	3	79	7	5
7	A037120001	Mountievers, Clare	1	1	83	10	5
Overall Study Area			4	3	79	10	5

5.3.7 Land Uses

The land on which the proposed development is located consists predominantly of coniferous forest within the northern section, a section of pastures on the central and southern sections of the site and broad leaved forests within the western section of the site. The surrounding landscape is mostly made up of agricultural land and pastures with some areas of forestry. Ribbon development is present along the local county roads. The surrounding area is well served by a network of local roads. There are no existing wind farms in close vicinity of the site. The landscape is predominantly undulating with a topography between 60m and 262m OD.

There are currently no defined recreational land-uses within or associated with the study area.

Immediately to the north east of the proposed development lies O'Connell Quarries which provides crushed aggregates in the Limerick and Clare area.

The land-use along the potential grid connection and substation comprises mainly conifer forestry, a section of pastures and includes one public road crossing.

The nearest primary school to the proposed development is Scoil Mhuire Miliuc in Meelick approximately 1.7km to southwest, while the nearest post-primary school is St Nessian's Community College in Moylish, Limerick, approximately 3.5km south. The nearest third level campus is Limerick Institute of Technology in Moylish Park, Limerick, approximately 3.8km south.

Meelick is 1km to the south of the proposed development and home to an active GAA club, church, and primary school. Ardnacrusha is 3.5km southeast of the proposed development. Ardnacrusha is predominantly residential and has grown in housing development since the hydro-electric power station was built here in 1929. Other amenities in the area include Ardnacrusha Pitch and Putt course, Ardnacrusha Garden Centre as well as River House Nursing Home.

The nearest town to the proposed development is Sixmilebridge which is approximately 6.7km west of the proposed development. There are a number of retail, commercial and community facilities within the town. The town is well located in relation to the surrounding settlements of Limerick, Shannon, and Ennis. The town is also served by a railway station which provides excellent connection to Limerick, Ennis, and Galway.

Further amenities are provided by Limerick City which is the nearest city to the proposed development, approximately 3km to the south.

5.3.8 Tourism and Amenities

While there are no tourist attractions pertaining specifically to the site of the proposed wind farm development, there are a number of cultural amenities in the wider area.

Limerick City and suburbs is located approximately 3km southeast of the proposed development and is the third most populous urban area in the state. Tourist attractions in the city centre include Limerick City Museum (c. 6.5km to the south), King John's Castle (c. 6km south), St Mary's Cathedral (c. 6km to the south), the Hunt Museum (c. 6.5km), The People's Museum of Limerick (c. 7km) and the University of Limerick (c. 6.5km south east).

Bunratty Castle is a popular tourist destination located approximately 10km southwest of the proposed site. The site on which Bunratty Castle stands was in origin a Viking trading camp in 970AD. The castle is adjacent to Bunratty Folk Park which is set on 26 acres of countryside.

8.5km southwest of the proposed development is Ballymorris Pottery. The workshop was established in 1994 and is based in Cratloe, County Clare. The workshop sells a variety of colourful domestic ware, individual ceramic art, commemorative plates, and ceramic signs. Pottery classes are also available.

As well as visitor attractions and resources which support outdoor recreational activity, there are a range of services which cater to tourists and visitors such as hotels, bed & breakfasts, and caravan parks. Such facilities are present in many of the settlements in the surrounding area including Ennis which is approximately 25km northwest of the site and Killaloe 17km to the northeast.

There are a number of popular trails in the wider area which serve as good recreational amenities for surrounding communities. 7km northwest of the proposed site is 12 o' clock hills, which is a popular trail route. The 12 o' clock hills are situated about 5km southeast of Kilkishen village and form part of the Slieve Bearnagh Mountain Range in East Clare. The route is accessible from two trailheads at Belvoir and Snaty on the L3016 road between Sixmilebridge and Broadford.

The East Clare Way is a long-distance trail and is designated as a National Waymarked Trail by the National Trails Office of the Irish Sports Council. It is a 180-kilometre (112-mile) long circular route that begins and ends in Killaloe. The circular route explores the hills and lakes to the west of Lough Derg and takes in the towns and villages of Kilbane, Broadford, O'Callaghans Mills, Tulla, Feakle, Flaggmount, Mountshannon and Scarriff. The northern sections of the trail cross the Slieve Aughty Mountains.

Other waymarked trails include the Lough Derg Way. The Lough Derg Way extends 68 kilometres from Limerick City to Dromineer in Co. Tipperary and passes approximately 4km southeast of the proposed site at its closest point.

The River Shannon flows in a southwesterly direction and is approximately 3km from the proposed site at its closest point. The River Shannon provides a range of recreational amenities for surrounding communities including angling, kayaking, sailing and powerboating.

There are a number of recreational amenities, particularly sports, in the wider surrounding areas of Limerick, Sixmilebridge, Killaloe and Ennis, including GAA, Rugby and Soccer facilities.

The location of the proposed development away from major tourist attractions and recreational activities will ensure that visitors are not directly impeded from the greater area during the operational phase. A range of attractions are present in the wider area from which the proposed development may be visible. This includes sites of historical, cultural, or natural interest. Although the proposed wind farm development may be visible from some attractions/amenities this will not impact on those attractions. A cultural heritage assessment for the project was also completed and is provided in **Chapter 13 Cultural Heritage**. Refer to **Chapter 12 Landscape and Visual** also.

5.4 Assessment of Effects

5.4.1 Construction Phase

5.4.1.1 Land Use Change

All new development proposals have the potential to effect the local area character and human environment by introducing a new incompatible land use activity which could result in 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.

During construction, there will be a level of effect on existing land-uses within the development site. Existing agricultural and forestry activities (apart from felling required for the proposed development) will cease within the footprint for the duration of the construction works. Public access within the site will also be prohibited during construction, operation and decommissioning, however as the lands are under private ownership public access is not available. Outside of the development footprint, it is not envisioned that land use activities would be adversely effected.

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 18-month construction period for health and safety purposes.

In terms of effects to neighbouring lands and land-uses, it is considered that the wind farm development does not pose a risk to either existing or future land-uses. All existing land-use practices can co-exist with the proposed wind farm.

Access may be restricted to landowners at times of heavy site activity such as component deliveries and concrete foundation pouring. Traffic procedures and effect mitigations within, through and around the development site at these times will be implemented. Prior to commencement of the works the applicant will engage with all stakeholders to minimise disruption and to provide any alternative access where possible.

The land-use along the potential grid connection comprises mainly conifer forestry, forestry track, a section of pastures and includes one public road crossing.

The active construction area for the grid connection will be small, ranging from 100 to 200 metres in length at any one time, and it will be transient in nature as it moves along the route. There are no residential properties along the route. The grid connection construction works is mainly located on conifer forestry and crosses a 3m section of local road north of the wind farm site. There will be restricted access to the local road for a period of 1-2 days during these works resulting in a **negative, brief to temporary** effect on local residents accessing the road. All works will be planned and undertaken in full consultation with Clare County Council, in particular the Roads Department/Roads Engineer for the area. A construction stage Traffic Management Plan will be developed with Clare County Council in advance of works. An **Outline Traffic Management Plan** is included in **Appendix 2D** of this **EIAR**.

Once in place, the grid connection will not affect existing or further land uses.

Outside of the proposed development footprint, it is not envisioned that land use activities would be adversely effected. The delivery of turbine components to the proposed development will require temporary works on sections of the public road network along the delivery route including relocation of powerlines/poles, lampposts, signage and temporary local road widening. Such works will be temporary in nature and reinstated following turbine component delivery.

Overall, it is considered that during the construction phase there is likely to be a **direct, short-term, slight to moderate, negative and localised** effect on land use within the wind farm site and along the grid connection route.

The requirement to replant land taken out of forestry would be an indirect effect of the proposed development. The total replanting requirement for the proposed development is c.15.97ha. It should be noted that the clear felling of trees in the State requires a felling licence. The associated afforestation of alternative lands equivalent in area to those lands being permanently clear felled is also subject to licensing ('afforestation licensing'). The Forest Service of the Department of Agriculture, Food & the Marine is Ireland's national forest authority and is responsible for all forest licensing. The Applicant commits to not commencing the project until both felling and afforestation licences are in place and this ensures the afforested lands are identified, assessed and licensed appropriately by the relevant consenting authority.

5.4.1.2 Population and Settlement

The proposed development is unlikely to have a significant 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. There will be no mass in-migration associated with the proposed development.

It is envisaged that 60 jobs will be created during the construction phase of the project. It is expected that the majority of construction personnel will primarily be local to the region. A minor number of key employees involved in the construction, may decide however to temporarily re-locate to the area in the short-medium term. Overall, throughout construction, operation, and decommissioning, it is expected that the development will have a **neutral** effect on population numbers.

5.4.1.3 Economic Activity

During the construction phase, aggregates and concrete supply for access track construction and foundations will be obtained from local quarries and suppliers, supporting the local economy. There are also potential economic opportunities for local companies and businesses to provide a range of services, including catering, accommodation and plant hire. It is expected that the construction period will have a **direct, short-term, localised**, and **positive** effect on economic activity.

5.4.1.4 Employment

In the construction phase, it is envisioned that resources and labour will be sourced in the region where possible. It is estimated that the construction phase will take approximately 18 months and may create approximately 60 full time equivalent (FTE) roles, which will have a **direct, positive, short-term**, and **moderate** effect on employment.

5.4.1.5 Tourism and Activities

While tourism has become a major economic driver in Clare, no significant economic benefits of this industry are directly associated with the proposed development lands. The development site is not currently used as a forest park or recreation site. There are no picnic facilities near the site or any direct tourist attractions or services at the site.

Given that there are currently no tourism attractions specifically pertaining to the proposed development site, there are no direct effects associated with the construction phase of the proposed wind farm development.

5.4.1.6 Human Health

While there is the potential for construction related hazards, serious risks to human health and safety are not envisioned.

Should a major accident or natural disaster occur, the potential sources of pollution onsite during both the construction and operational phases are limited. Sources of pollution with the potential to cause significant environmental pollution and associated negative effects on health such as bulk storage of hydrocarbons or chemicals, storage of wastes etc. are limited.

There is limited potential for significant natural disasters to occur at the proposed development site. Ireland is a geologically stable country with a mild temperate climate. The potential natural disasters that may occur are therefore limited to flooding and fire. The risk of flooding is addressed in **Chapter 8 Water**. It is considered that the risk of significant fire occurring, affecting the wind farm and causing the wind farm to have significant environmental effects is limited. As described earlier, there are no significant sources of pollution in the wind farm with the potential to cause environmental or health effects. Also, the spacing of the turbines and distance of turbines and substation from any properties limits the potential for effects on human health.

Major industrial accidents involving dangerous substances pose a significant threat to humans and the environment; such accidents can give rise to serious injury to people or serious damage to the environment, both on and off the site of the accident. The proposed development site is not regulated or connected to or close to any site regulated under the Control of Major Accident Hazards Involving Dangerous Substances Regulations i.e. SEVESO sites and so there is no potential effects from this source.

During construction and decommissioning 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;
- Safety, Health & Welfare at Work Act 2005;
- Safety, Health & Welfare at Work (General Applications) Regulations 2007 to 2020; and

- Irish Wind Energy Association Best Practice Guidelines.

If blasting is required, it will be done in accordance with a site specific blasting plan. Pre-notification signs and warnings to any potentially affected landowners will be undertaken. The provision of underground electric cables of the capacity proposed is common practice throughout the country and installation to the required specification does not give rise to any specific health concerns. 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.

Under normal conditions, access to the site and turbines is very safe for people and animals. It is not anticipated that the workings of the turbines will present any danger to the public. The rigorous safety checks imposed on the turbines during design, construction, commissioning, and operation ensures the risks to humans are negligible. The safety and health record of the wind energy industry worldwide is exceptionally good.

Construction works and new development not only can pose safety risks but can also give rise to potential effects on general amenity affecting health and wellbeing. General amenity relates to 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 such as noise, dust and traffic are potential factors for the devaluation of amenity. The potential wellbeing and disturbance effects of the proposed wind farm scheme on the local human environment have been identified as follows:

- Dust emissions from construction and decommissioning activities;
- Noise emissions during construction activities and operation;
- Visual effects during construction and operation;
- Traffic disturbance during construction.

Each of these issues has been fully assessed and is documented in other chapters of the **EIAR** as set out in **Table 5-11**. These assessments were reviewed to inform this study and it is concluded having regard to these environmental factors, under which human health effects might occur, there will be no significant effects on human health as a result of the project.

Table 5-11: Potential Disturbance issues and relevant assessment

Development Phase	Potential Disturbance/Health & Safety Issue	Addressed in EIAR Chapter
Construction Phase	Noise emissions and vibration	Chapter 10 Noise and Vibration
	Dust emissions	Chapter 14 Air and Climate
	Traffic disturbance	Chapter 15 Material Assets
Operational Phase	Noise emissions and vibration	Chapter 10 Noise and Vibration
	Visual quality effects	Chapter 12 Landscape and Visual
	Air quality effects	Chapter 14 Air and Climate
Decommissioning	Shadow flicker disturbance	Chapter 11 Shadow Flicker
	Traffic disturbance	Chapter 15 Material Assets
	Noise emissions and vibration	Chapter 10 Noise and Vibration

Traffic and Road Usage

Potential effects on the surrounding road network will arise principally during the construction phase. Peak daily construction traffic is predicted to be 252 no. 2-way HGV movements (126 each way) with the predicted highest peak hourly HGV traffic volumes to be approximately 21 deliveries per hour. Peak construction traffic would principally occur during turbine base pours and therefore arise on twelve occasions.

Traffic studies carried out for the proposed development indicate that while there will be an increase of traffic volume on the local public road network during the construction phase, this increase will be well within the carrying capacity of the local public road network. 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. There will be a slight, short-term negative effect on traffic over the 18-month construction programme with isolated, localised peaks of brief but moderate effects.

Works for the majority of the grid connection are off the public road. The proposed grid connection will intersect at the 3-metre-wide local public road, north of the site. The works will be brief and appropriate traffic control and management systems will be in place to minimise as far as possible traffic disruption to road users. Once the works are complete, the road will be reinstated.

Once operational, the wind farm will not generate any negative effects on traffic in the locality.

Noise

The construction phase has the potential to generate noise emissions which has the potential to cause disturbance to local noise sensitive areas. The results of the construction noise predictions indicate that noise generated during the construction phase will not exceed the noise limits in the BS5228 Construction Noise Guidelines at any dwelling location, for the duration of the construction phase. The noise assessment proposes recommendations regarding measures of reducing the amount of noise reaching the noise sensitive areas in accordance with BS5228-1&2 +A1 2014, *Code of Practice for the Control of Noise and Vibration on Construction and Open Sites*.

Air Quality

There is the potential for temporary adverse effects in terms of dust emissions during the construction phase of the development.

Vehicle and fugitive dust emissions would occur primarily during project construction. Dust generated during the construction phase is not likely to significantly affect the local air quality. Given the distances to the nearest sensitive receptors, dust levels will not exceed the recommended TA Luft 350mg/m³/day guide-limit. There is, however, the possibility of dust occurring in the vicinity of the site entrances and along the local public road which could affect road users. This is considered a **temporary minor** adverse effect and mitigation will be implemented.

With the effective implementation of standard dust management measures to control and reduce dust, no significant adverse effect, in terms of a community disturbance is likely to occur.

5.4.2 Operational Phase

5.4.2.1 Land Use Change

During operation it is considered that the proposed development would not constitute significant negative effects in terms of land-use considerations for the following reasons:

- The proposed development does not conflict with any planning policies or zoning provisions for this area.

- The proposed development will not introduce any activities or features which are otherwise currently unusual to the area. There are therefore no changes to the patterns and types of activity in the area as a result of the proposed project.
- There will be no loss of rights of way or amenities as a result of the proposed development.
- In terms of effects to neighbouring lands and land-uses it is considered that the proposed development does not pose a significant risk to either existing or future land-uses. All existing land-use practices can co-exist with the development.

Once operational, conventional agricultural and forestry activities will continue to take place at the site independent of the wind farm proposal. Only a relatively small area of commercial forestry, approximately 15.97ha of the forestry resource in the area locally, will be permanently displaced in the footprint of the wind farm infrastructure. This loss of land use would not be significant.

In terms of effects to neighbouring lands and land-uses it is considered that the 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 wind farm. The proposed development is **likely** to have a **direct, long-term, neutral, and localised** effect on land use.

5.4.2.2 Population and Settlement

During operation, the proposed development would however bring added benefit to the local community through the provision of a community benefit fund. This fund would assist local communities to enhance and/or maintain a range of amenities and services for residents in the local towns, villages and surrounding hinterland, which in turn would help sustain existing population levels in the area. Therefore, it is likely that the proposed development would **indirectly** have a **long-term, positive, localised** effect on population and settlement in the region. Further details are outlined in **Chapter 1 Introduction** of this EIAR.

5.4.2.3 Economic Activity

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 **neutral** effect during the operational and decommissioning stages.

5.4.2.4 Employment

In the long-term, the development is expected to generate full-time employment for a small number of persons during its operational phase; however these may not be all locally based.

The Sustainable Energy Authority of Ireland estimates, in their 'Wind Energy Roadmap 2011-2050', that '*Onshore and offshore wind could create 20,000 direct installation and O&M jobs by 2040*'. Furthermore, '*wind energy resource represents a significant value to Ireland by 2050. This value is presented in terms of its ability to contribute to our indigenous energy needs, the benefits of enhanced employment creation and investment potential, and the ability to significantly abate carbon emissions to 2050*'.

Consequently, this effect is rated as **directly** having a **slight, positive, long-term** and **moderate** effect on employment.

5.4.2.5 Tourism and Activities

The location of the wind farm development away from major tourist attractions will ensure that visitors are not directly impeded from the larger area during the operational phase. However, a range of attractions are present in the wider area from which the development may be visible. This includes sites of historical, cultural or natural interest as well as sites or linear routes which support a diverse range of outdoor recreational activities including walking, cycling and fishing.

Chapter 12 Landscape and Visual describes the assessment of landscape and visual effects. Overall this assessment concluded that the wind farm development will have a moderate to significant effect. While visual perception is largely subjective, it is considered based on the assessment in terms of both the overall effect on landscape character and the nature and extent of visual effects that the wind farm would be **unlikely** to have a **significant, adverse** effect the existing or future tourism potential of the area.

5.4.2.6 Human Health

During the operational phase, potential electrical risks are associated with turbine transformers, switches and cabling. It is not envisioned that these will however pose any significant risk as these will fully meet health and safety regulations relating to high voltages.

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

The EirGrid document '*EMF & You: Information about Electric & Magnetic Fields and the electricity transmission system in Ireland*' (EirGrid, 2014) provides further practical information on EMF.

Access to the turbines and the substation will be controlled during operation to ensure the public are restricted for their safety, however as the lands are under private ownership public access is not available. The substation will be surrounded by a steel palisade fence.

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. The separation distances of turbines from public roads and residences are well beyond fall over distances that would present a risk of significant accidents.

Overall, it is not expected that the Project will result in significant effects resulting in the risk of major accidents and disasters, nor is the project considered vulnerable to risks of major accidents and disasters.

Overall, the project will have an **indirect, long-term, slight, positive** and **moderate** effect on human health in the long term by contributing to the production of clean renewable energy.

Traffic and Road Usage

There will no significant levels of traffic during the operational phase.

Noise

The 2017 HSE position paper states that "There is no direct evidence that exposure to wind farm noise affects physical or mental health". Similarly, The World Health Organization states that "There is no reliable evidence that sounds below the hearing threshold produce physiological or psychological effects".

There is no reliable published scientific evidence that demonstrates that the health of people living in proximity to modern wind turbines is physiologically effected by the noise emitted. Wind turbine noise does however have potential to be a source of annoyance for some people.

Chapter 10 Noise and Vibration of this **EIAR** considers the effects of noise emitted for the proposed development against national guidelines.

During the operational phase, the proposed turbines are predicted not to exceed DoEHLG noise limits. In the unlikely event that a complaint of Amplitude Modulation arises during the operation of the wind farm, an investigation into the phenomenon will be carried out in accordance with best practice. Mitigation measures outlined in **Chapter 10 Noise and Vibration** will be applied if required.

In the unlikely event an issue regarding low frequency arises, the matter will be fully investigated with regard to best practice and guidance at the time. Currently guidance is outlined in Appendix VI of the EPA document entitled *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities* (NG4) (EPA, 2016).

Considering the above and the separation distance between the wind farm and nearest residential receptors and with adherence to the national guide limits, the local population is unlikely to experience adverse effects from noise.

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 HSE position paper (2017) states that, "There is insufficient direct evidence to draw any conclusions on an association between shadow flicker produced by wind farms and health effects. Flashing lights can trigger seizures among people with a rare form of epilepsy called photosensitive epilepsy. The risk of shadow flicker from wind farms triggering a seizure among people with this condition is estimated to be extremely low".

The proposed development has the potential to give rise to shadow flicker effects on surrounding dwellings. The modelling undertaken, assumes a worst-case scenario, and has determined that 12 No. properties could theoretically experience potential shadow flicker reaching or exceeding threshold values greater than 30 hours per year. The modelling undertaken has also determined that 79 No. properties could theoretically experience potential shadow flicker exceeding the 30 minutes per day guideline limit set out in the current 2006 Wind Energy Development Guidelines. However, the proposed wind turbines will be equipped with a shadow flicker module to prevent shadows at critical times, therefore there will be no shadow flicker at sensitive receptors/nearby dwellings during the wind farm operational phase. Therefore, the proposed development will not have significant negative effects on nearby dwellings as a result of shadow flicker (Refer to **Chapter 11 Shadow Flicker** for further details).

Air Quality

The proposed development will make a positive contribution to air quality once operational, displacing GHG emissions which would otherwise be emitted by fossil fuel powered electricity.

5.4.2.7 Climate Change

The proposed wind farm project will facilitate decarbonisation objectives at local and national levels as set out in the 2023 National Climate Action Plan and the 2023 - 2029 Clare County Development Plan which states that Clare County Council will facilitate the development of energy sources which will achieve low carbon outputs.

The project will have a **long-term, direct, slight, positive** and **extensive** effect on climate change. Further details in **Chapter 14 Air and Climate** of this EIAR.

5.4.2.8 Visual Effects

A landscape and visual impact assessment was carried out in relation to the proposed development (Refer to **Chapter 12** of this EIAR). A total of 26 viewpoints were used to determine the visual presence of the proposed wind farm. From these viewpoints photomontages were prepared and an assessment completed.

Given the size of the turbine structures and their proposed position along an upland area, a visual consequence is unavoidable. However, 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 affected and of course public perception.

The proposed Ballycar wind turbines will be prominent in some views from very close to the site and will be visible from certain long distance viewpoints. Overall, the development will have a moderate to significant visual effect in that the proposed turbines will be apparent and recognisable new elements within the landscape.

5.4.3 Demolition or Decommissioning Phase

Once the operational period is complete, a 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 wind farm 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 likely remain in place as part of the permanent electrical infrastructure.

When the site is to be decommissioned, 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. Any potential waste soil will be notified under Article 27 (European Communities (Waste Directive) Regulations 2011) or treated to comply with Article 28 (European Communities (Waste Directive) Regulations 2011) if practicable. Any materials containing invasive species will be appropriately managed and sent to authorised facilities.

Underground cables will likely be cut back and left underground as removal may do more harm than leaving them *in situ*.

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

Any structural materials suitable for recycling will be disposed of in an appropriate manner.

Potential effects and consequential effects from the decommissioning phase will be similar to those from the construction phase. Given that there will be no significant groundworks required from the decommissioning phase, effects or associated effects will be materially less than the construction phase of the proposed development. The decommissioning phase will have no significant effects once mitigation measures prescribed for traffic, noise and dust effects are implemented as described in their **EIAR** relevant chapters.

5.4.4 Do Nothing

An alternative to the proposed development of Ballycar 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 economical 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 noise, shadow flicker or visual effects which are associated with wind farms. 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 2023.

5.4.5 Cumulative Effects

The list of all projects considered for the cumulative assessment are included in **Section 2.3.21 of Chapter 2** of this **EIAR**. Each of the projects listed were considered with respect to potential cumulative effects on population and human health.

Small scale projects listed in **Section 2.3.21 of Chapter 2** will not result in cumulative effects and can be discounted from the impact assessment.

The larger scale renewable energy projects within 25km of the proposed development are listed below:

- Parteen Wind Farm (single turbine) (permission for retention and changing of position granted);
- Vistakon Wind Farm (single turbine) (existing);
- Castlewaller Wind Farm (Permitted but not constructed);
- Carrownagowan Wind Farm (Permitted, under Judicial Review);
- Carrownagowan Wind Farm Grid Connection (Submitted);
- Fahy Beg (in Planning);
- Drummin Solar Farm (Permitted but not constructed);
- Ballyglass Solar Farm (in Planning).

The closest permitted (approved) but not yet constructed wind farm of significant scale (Carrownagowan) to Ballycar is at a distance of approximately 12km. Fahy Beg Wind Farm (refused by Clare County Council but appealed to An Bord Pleanála) is located approximately 8.5km to the north east.

The nearest proposed solar farms to the proposed development are listed as follows:

- Drummin Solar Farm – 70 hectares of 309,008 m² of solar photovoltaic panels, a 38 kV electrical substation and other ancillary works (Permitted by Clare County Council but not yet constructed);
- Ballyglass Solar Farm – c. 265,000 m² of solar panels on ground mounted frames and other ancillary works (Permitted by Clare County Council, Appealed to An Bord Pleanála).

Drummin Solar farm is located approximately 2km east of the proposed development while Ballyglass is located approximately 4km east. The potential for cumulative effects on the local population and human health, in particular noise, shadow flicker, traffic, air quality and visual effects are discussed in further detail in relevant chapters.

Shadow Flicker Control Measures will ensure there is no Shadow Flicker from Ballycar Wind Farm. The distances from the nearest proposed and approved wind farms of scale (greater than 1no. turbine), Fahy Beg Wind Farm (c.8.5km) and Carrownagowan Wind Farm (c.12km), are sufficient enough to ensure that there are cumulative effects to the proposed development.

During the construction phase, there is a brief stretch along the local road L7062 where traffic from the Fahy Beg development might coincide with that of the proposed Ballycar development. In the event that projects overlap, it is worth noting that there will be no significant cumulative effect. While the likelihood of both developments operating at peak construction simultaneously is low, this local road typically experiences very light traffic and has the capacity to accommodate a temporary increase if necessary.

The routes associated with the solar farm developments (Drummin and Ballyglass) do not coincide with construction traffic generated by the proposed development and therefore no cumulative effects are expected, refer to **Chapter 15 Material Assets** for further details of cumulative traffic. Consultation will be undertaken with Clare County Council and local residents to ensure that cumulative effects with other projects would be minimised.

The noise effect from existing, permitted, or proposed developments are addressed in the noise chapter (refer to **Chapter 10 Noise and Vibration**) and no cumulative noise effects are anticipated.

Operation of the proposed development will not result in any significant air emissions. The proposed development along with other renewable energy developments will however contribute to cumulative long-term beneficial greenhouse gas and climate change effects.

The visual impact assessment also assessed the cumulative effect of the proposed development along with other planned or operating wind turbines in the area. In summary, it is considered that the montages indicate that the majority of the views where other turbines are visible (in combination), these appear as distant and distinct wind farms, and do not result in a proliferation of turbines in any one view, or any cases where one wind farm is seen behind the other and in close proximity. Cumulative visibility is considered to vary throughout the study area, ranging from Slight to Moderate.

5.5 Mitigation and Monitoring Measures

5.5.1 Mitigation Measures

The potential for significant effects on the human environment will principally arise during the construction phase from traffic, noise and dust effects and during the operational phase from noise and shadow flicker effects. Mitigation in relation to these issues are outlined in their respective Chapters of this **EIAR (Chapter 10 Noise and Vibration, Chapter 11 Shadow Flicker, Chapter 12 Landscape and Visual, Chapter 14 Air and Climate, Chapter 15 Material Assets)**.

In relation to the local community, with Community Benefit Fund Guidelines, governed by the Sustainable Energy Authority of Ireland (SEAI), and based on the current project scope, the proposed wind farm development will generate a Community Benefit Fund estimated at €3.75 million over the first 15 years of operation. This amounts to approximately €250,000 per annum.

All Forest Service guidelines and Health and Safety legislation will be adhered to during all forestry-related activities at the proposed replanting lands. The potential for significant negative effects on worker and public health and safety is therefore minimal. No additional mitigation is proposed here.

No significant adverse effects are likely on Population and Human Health as a result of the proposed development.

5.5.2 Monitoring Measures

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

5.5 Residual Effects

With the mitigation measures in place, **no** significant negative 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 implementation of mitigation measures, noise disturbances will be kept to a minimum and within acceptable noise limits;
- With the implementation of mitigation measures, shadow flicker effects will be eliminated 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.

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

5.6 Conclusion

The construction phase of the proposed development may cause a temporary disturbance to the local community, however this phase of the proposed development is likely to only pose temporary minor disturbances locally and are detailed below.

The main disturbance during the construction phase of the proposed development will be the generation of additional traffic on the local road networks. Additional traffic on the local road networks present noise and safety implications as a concern. The disturbances associated with additional traffic volumes will however be confined to the construction phase of the proposed development and will not be a concern once works are complete. The construction phase will be managed so that effects to the human environment and local residents are managed. Mitigation measures outlined in the relevant **EIAR** Chapters will be implemented and therefore, no significant negative effects on the local human environment are expected.

The operational phase of the proposed development is not expected to present any adverse effects on the human environment. The production of electricity by wind energy is environmentally-friendly and thus prevents risk of air pollution and risk to human health.

Noise effects are not considered to be significant. The noise assessment demonstrates that the proposed wind farm will operate within the recommended noise limit criteria in the wind energy planning guidelines for all noise sensitive receptors surrounding the development and thus will not cause an adverse effect on the quality of life of local residents and the existing relatively tranquil environment in which they live.

The shadow flicker assessment demonstrates that while there is potential for a number of dwellings to experience shadow flicker effects, the operational mitigation measures which will be implemented (i.e., turbines will be programmed to shut down during periods when shadow flicker is predicted to occur) ensures that shadow flicker will be eliminated at all residential receptors.

The operational phase will be managed to minimise the effect on the human environment and the local residents. The noise assessment demonstrates that the proposed wind farm will operate within the recommended noise limit criteria in the wind energy planning guidelines. With the mitigation measures in place, no significant negative effects on the human environment are expected.

Given the size of the turbine structures and their proposed position along an open upland area, 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 affected and of course public perception. A landscape and visual impact assessment was carried out in relation to the proposed development. Overall, the development will have a moderate to significant visual effect in that the proposed turbines will be apparent and recognisable new elements within the landscape.

5.7 References

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