5 POPULATION AND HUMAN HEALTH

5.1 INTRODUCTION

This chapter considers the potential effects on population and human health arising from the proposed Shronowen Wind Farm, a 12-turbine wind energy development in Co. Kerry. A full description of the proposed development, development lands and all associated project elements is provided in Chapter 2 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 impacts;
- evaluation of effects significance;
- consideration of mitigation measures, where appropriate.

5.1.1 Scope of Assessment

The following EPA publications were consulted as part of the scoping of topics for this assessment.

- *Guidelines on Information to be contained in Environmental Impact Statements (2002),*
- *Draft Guidelines on Information to be contained in Environmental Impact Assessment Reports (2017),*
- *Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) (2003),*
- *Draft Advice Notes for the Preparation of Environmental Impact Statements (2015),* and
- European Commission's *Guidance on the preparation of the EIA Report* (Directive 2011/92/EU as amended by 2014/52/EU) (2017)

Table 5-1 outlines the issues which the EPA guidance documents suggest may be examined as part of the human environment 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 patterns 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 to alter the character and use of the surroundings?*
Tourism	- *will the development affect the tourism profile of the area?*
Health and Safety	- *vectors through which human health impacts could be caused e.g. will there be risks of death, disease, discomfort or nuisance?*

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.

5.1.1.1 Tourism and Amenities

Tourism and amenity impacts 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 13 Landscape and Visual, Chapter 14 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.

5.1.1.2 Human Health

The European Commission document 'Guidance on the preparation of the Environmental Impact Assessment Report, 2017; provides that: *"Human health is a very broad factor that would be highly Project dependent. The notion of human health should be considered in the context of the other factors in Article 3(1) of the EIA Directive and thus environmentally related health issues (such as health effects caused by the release of toxic substances to the environment, health risks arising from major hazards associated with the Project, effects caused by changes in disease vectors caused by the Project, changes in living conditions, effects on vulnerable groups, exposure to traffic noise or air pollutants) are obvious aspects to study. In addition, these would concern the commissioning, operation, and decommissioning of a Project in relation to workers on the Project and surrounding population".*

Similarly, the EPA Draft Guidelines on the information to be contained in environmental impact assessment reports (2017), 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 (2017) guidance also advises that '*The evaluation of effects on these pathways is carried out by reference to accepted standards 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 nuisance 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 impacts during operation
- Shadow flicker during operation
- Traffic nuisance 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 5-2**. These assessments were reviewed to inform this study.

Table 5-2 Nuisances and Health and Safety issues and relevant assessment

Development Phase	Potential Nuisance / Health & Safety Issue	Addressed in EIAR Chapter
Construction Phase	Noise emissions and vibration	Chapter 11 Noise
	Dust emissions	Chapter 10 Air and Climate
	Public safety	Chapter 2
	Traffic nuisance	Chapter 15 and Appendix 15-1 Traffic and Transport Assessment
Operational Phase	Noise emissions and vibration	Chapter 11 Noise
	Visual impacts	Chapter 13 Landscape
	Air quality impacts	Chapter 10 Air and Climate
	Shadow Flicker nuisance	Chapter 12 Shadow Flicker
	Telecommunications interference	Chapter 15 Material Assets
	Public safety	Chapter 2
Decommissioning	Traffic nuisance	Chapter 15 and Appendix 8 Traffic and Transport Assessment
	Noise emissions and vibration	Chapter 11 Noise

5.1.2 Replacement Forestry

Approximately 3.15 ha (hectares) of forestry will be felled to facilitate construction of the proposed wind farm. It is a Forestry Service requirement that lands taken out of forestry are replaced by replanting on other lands. A potential replanting site has been identified at a location to the north of the proposed wind farm site as outlined in **Chapter 2**. These are marginal lands of low ecological value, as outlined in **Chapter 6**. Assessment of the replacement forestry lands in this chapter is made in the context of land-use only.

5.1.3 Study Area

The Study Area for the purpose of this assessment on Population and Human Health primarily focuses on the local receiving human environment in the vicinity of the proposed wind farm development site. These include those who reside, work, visit, or use the local road networks in the general area. 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. 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 5-3** and **5-4**.

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 Impact;
- Cultural Heritage Impact; and
- Material Assets Impact (including Traffic and Transportation, Telecommunications and Aviation).

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

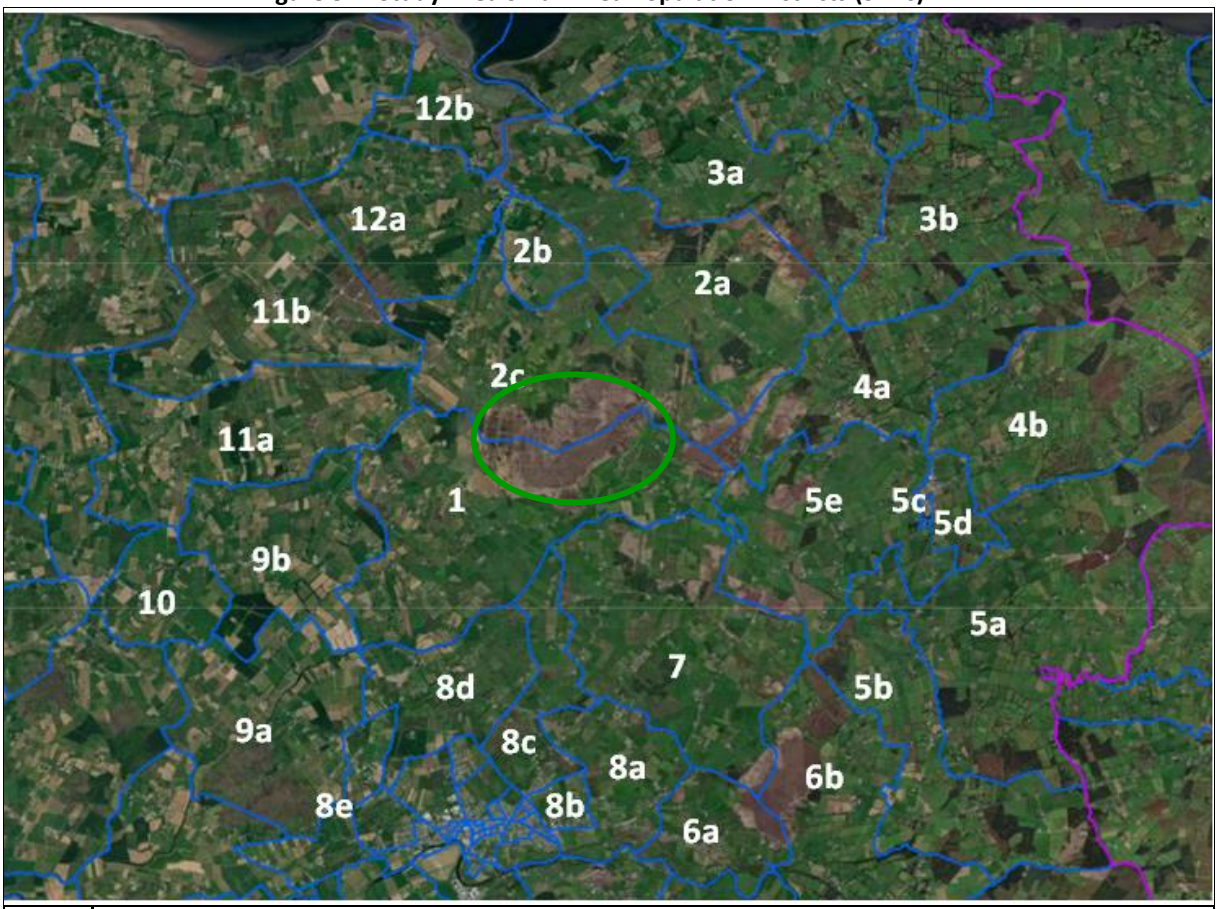
Key	
	Electoral Divisions (EDs)
	Location of Proposed Wind Farm Development lands
	County Boundary

Source: Adapted from CSO SAPMAPS

Table 5-3 Study Area Electoral Divisions (EDs) List

Area Ref	Electoral Division	Area Ref	Electoral Division
1	Shronowen	**7**	Cloontubbrid
2	Lislaughtin	**8**	Listowel Rural
3	Tarmon	**9**	Gunsborough
4	Leitrim	**10**	Ballyconry
5	Newtownsandes	**11**	Lisselton
6	Kilmeany	**12**	Carrig

Figure 5-2 Study Area Small Area Population Districts (SAPs)



Source: Adapted from CSO SAPMAPS

Table 5-4 Study Area Small Areas and Electoral Divisions

Area Ref	CSO SMALL AREA	Electoral Division
1	**077152001**	Shronowen
2a	**077125001**	Lislaughtin
2b	**077125002**	
2c	**077125003**	
3a	**077158001**	Tarmon
3b	**077158002**	
4a	**077123001**	Leitrim
4b	**077123002**	
5a	**077142001**	Newtownsandes
5b	**077142002**	
5c	**077142003**	
5d	**077142004**	
5e	**077142005**	
6a	**077109002**	Kilmeany
6b	**077109003**	
7	**077051001**	Cloontubbrid
8a	**077127005**	Listowel Rural
8b	**077127004**	
8c	**077127007**	

Area Ref	CSO SMALL AREA	Electoral Division
8d	**077127006**	
8e	**077127002**	
9a	**077086001**	Gunsborough
9b	**077086002**	
10	**077014001**	Ballyconry
11a	**077126001**	Lisselton
11b	**077126002**	
12a	**077041001**	Carrig
12b	**077041002**	

5.1.4 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 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 Kerry 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, Go Kerry 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.

5.1.5 Assessment Criteria

Determination of the significance of an effect will be made in accordance with the terminology outlined in the EPA *Draft Guidelines on Information to be contained in Environmental Impact Assessment Reports (2017)* as set out in **Table 5-5** below.

Table 5-5 Impact 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 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
	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 SOx and NOx to produce smog).

Source: EPA *Draft Guidelines on Information to be contained in Environmental Impact Assessment Reports (2017)*

5.1.6 Statement on Limitations and Difficulties Encountered

There were no limitations or difficulties encountered in undertaking this assessment.

5.1.7 Competency of Assessor

The assessment was completed by Caitríona Fox BA MSc of Malachy Walsh and Partners. Caitríona holds a Masters Degree in Sustainable Development and a Degree in both Geography and Mathematics. Caitríona has worked as an environmental professional since graduating in 1999 and has been employed as a Senior Environmental Consultant with Malachy Walsh and Partners since 2007. She is a practitioner of Environmental Impact Assessment (EIA) and has wide ranging experience in the area of environmental consultancy and planning. As an environmental practitioner, she is very familiar with all relevant legislation, guidance and codes of practices in the area of EIA. She has considerable experience in environmental project management and has been the Lead EIA project manager for a variety of project types including wind energy, marine developments, industrial, quarrying and commercial developments. She is experienced in undertaking EIA screenings and in the co-ordination and preparation of environmental impact statements and environmental reports. Specialist environmental assessment topics include population and human health assessment and landscape impact assessment.

5.2 EXISTING RECEIVING ENVIRONMENT

5.2.1 Development Location

The proposed development is situated within a rural area of open low-lying peatland in North Co. Kerry, the site of the proposed wind farm development is located east of the R552 Regional Road approximately 4km southeast of Ballylongford village and 6km north of Listowel town.

5.2.2 Settlement Patterns

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

Listowel town (population 4,820, CSO 2016) approximately 6km to the south 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 of Ballybunnion and Tarbert and the villages of Ballylongford, Astee, Lisselton and Moyvane. 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 urban settlements to the site of the proposed development are Listowel town and the villages of Ballylongford and Moyvane, as shown in **Figure 5-3** below.

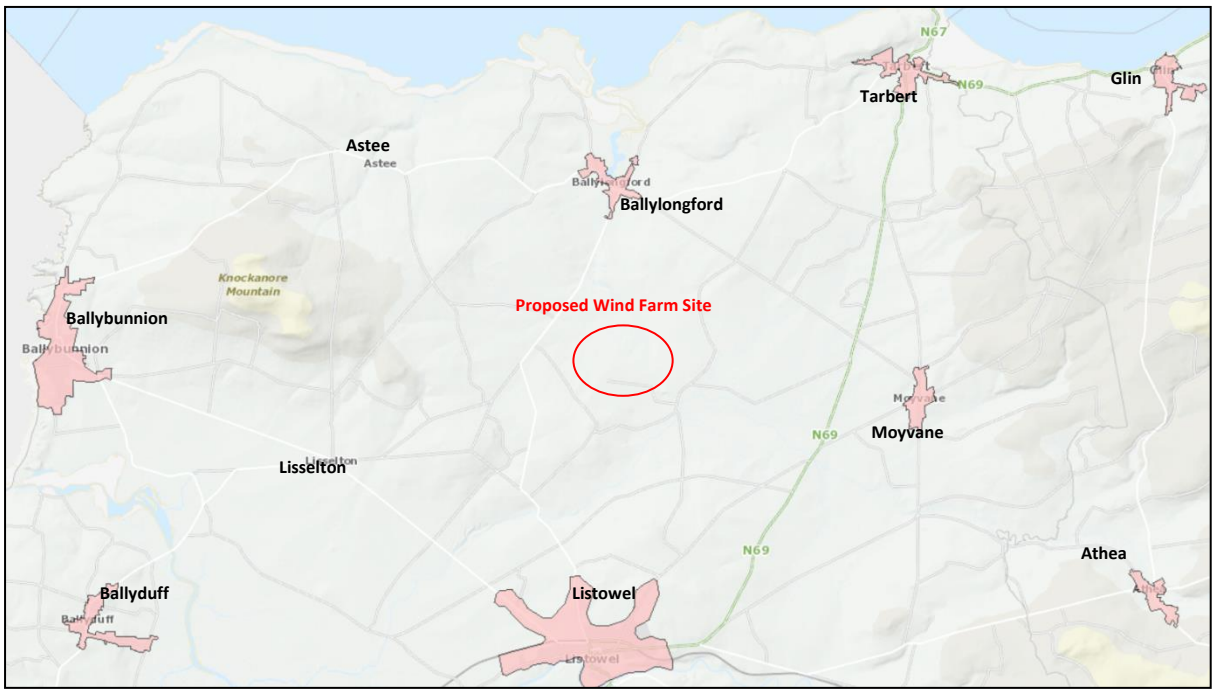


Figure 53 Principal Towns/villages in the Area
Source: Adapted from CSO SAPMAPS

The proposed development lands extend across part of the rural townlands of Coolkeragh, Ballyline West, Dromalivaun, and Tullamore. 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**

5-4. The greatest density of settlement occurs along the local road networks in clustered and ribbon development to the north west and south west of the development site.

There are no residential dwellings within the proposed development site boundary. There are approximately 48 dwellings, some of which are unoccupied, within less than 1km of the nearest wind turbine. The nearest residential property to a turbine is 566m.

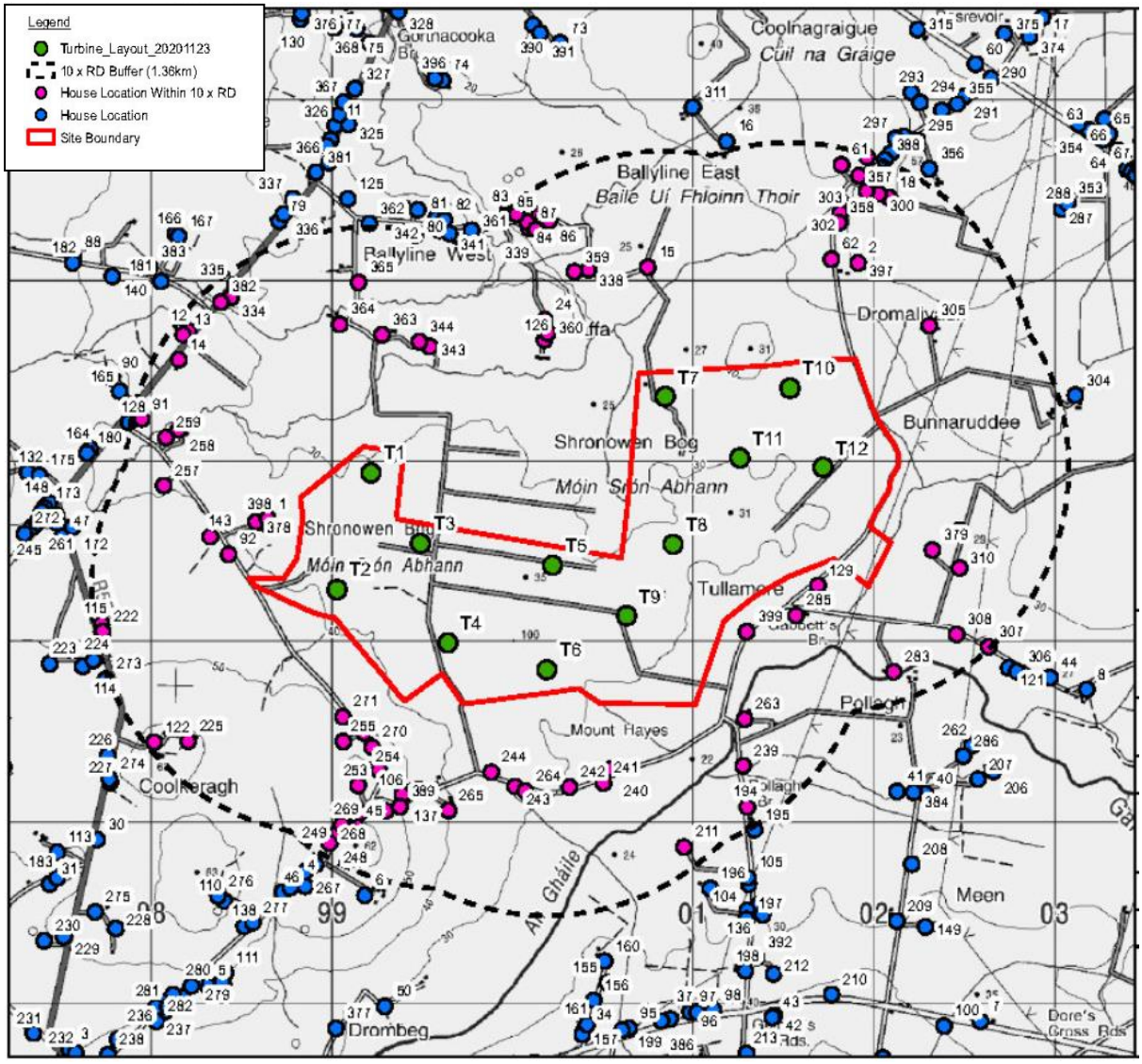


Figure 5-4 Residential Dwellings in vicinity of proposed development

A review of the Kerry County Council planning data base shows that, with the exception of planning permission for an extension to an existing family residence, there are no other planning permissions granted within the past five years for a new residential dwelling within 1km of site.

5.2.3 Population Density

The 2016 Census of Population provides population statistics for small geographical areas and electoral divisions. A review of this data shows that while the recorded population density across the study area varies between the electoral divisions, the overall region is moderately populated.

Population densities outside of the main settlement centres in the area range from approximately 14 persons per km^2 to 73 persons per km^2, as illustrated in **Figure 5-5** below.

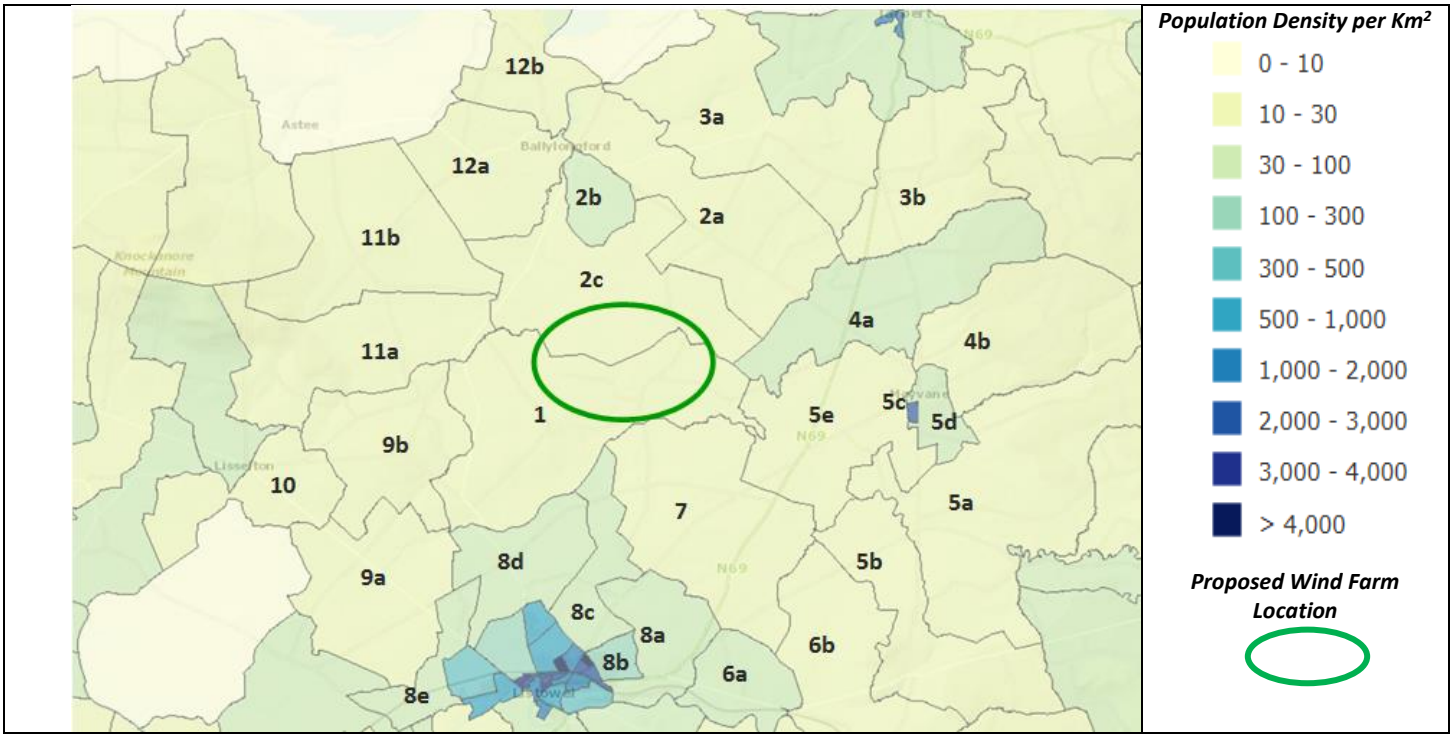


Figure 5-5 Local Population Density per Km^2
Source: ***Adapted from CSO SAPMAPS*** *http://airomaps.nuim.ie/id/Census2016/*

Table 5-6 Small Area Population Statistics

Area Ref	CSO SMALL AREA	Electoral Division	Total Population	Population Density per km^2
1	**077152001**	Shronowen	237	15.6
2a	**077125001**	Lislaughtin	230	19.78
2b	**077125002**		188	91.5
2c	**077125003**		169	14.1
3a	**077158001**	Tarmon	237	19.8
3b	**077158002**		239	28.8
4a	**077123001**	Leitrim	293	30.1
4b	**077123002**		252	25.2
5a	**077142001**	Newtownsandes	267	15.5
5b	**077142002**		199	22.2
5c	**077142003**		207	2,461.7
5d	**077142004**		148	92.7
5e	**077142005**		197	20.8
6a	**077109002**	Kilmeany	210	60
6b	**077109003**		274	26.8
7	**077051001**	Cloontubbrid	322	25.5
8a	**077127005**	Listowel Rural	312	73.2
8b	**077127004**		175	228.7
8c	**077127007**		244	71.1
8d	**077127006**		234	46.0
8e	**077127002**		253	99.3
9a	**077086001**	Gunsborough	179	19.8
9b	**077086002**		199	26.03
10	**077014001**	Ballyconry	146	26.6

11a	**077126001**	Lisselton	200	20.1
11b	**077126002**		169	15.3
12a	**077041001**	Carrig	178	26.5
12b	**077041002**		173	15.6

5.2.4 Population Trends

The available data on population trends for the period 2011-2016 indicates that while some Electoral Divisions experienced increases in population numbers, most areas are experiencing a population decline. Refer to **Figure 5-6** below and **Table 5-7**.

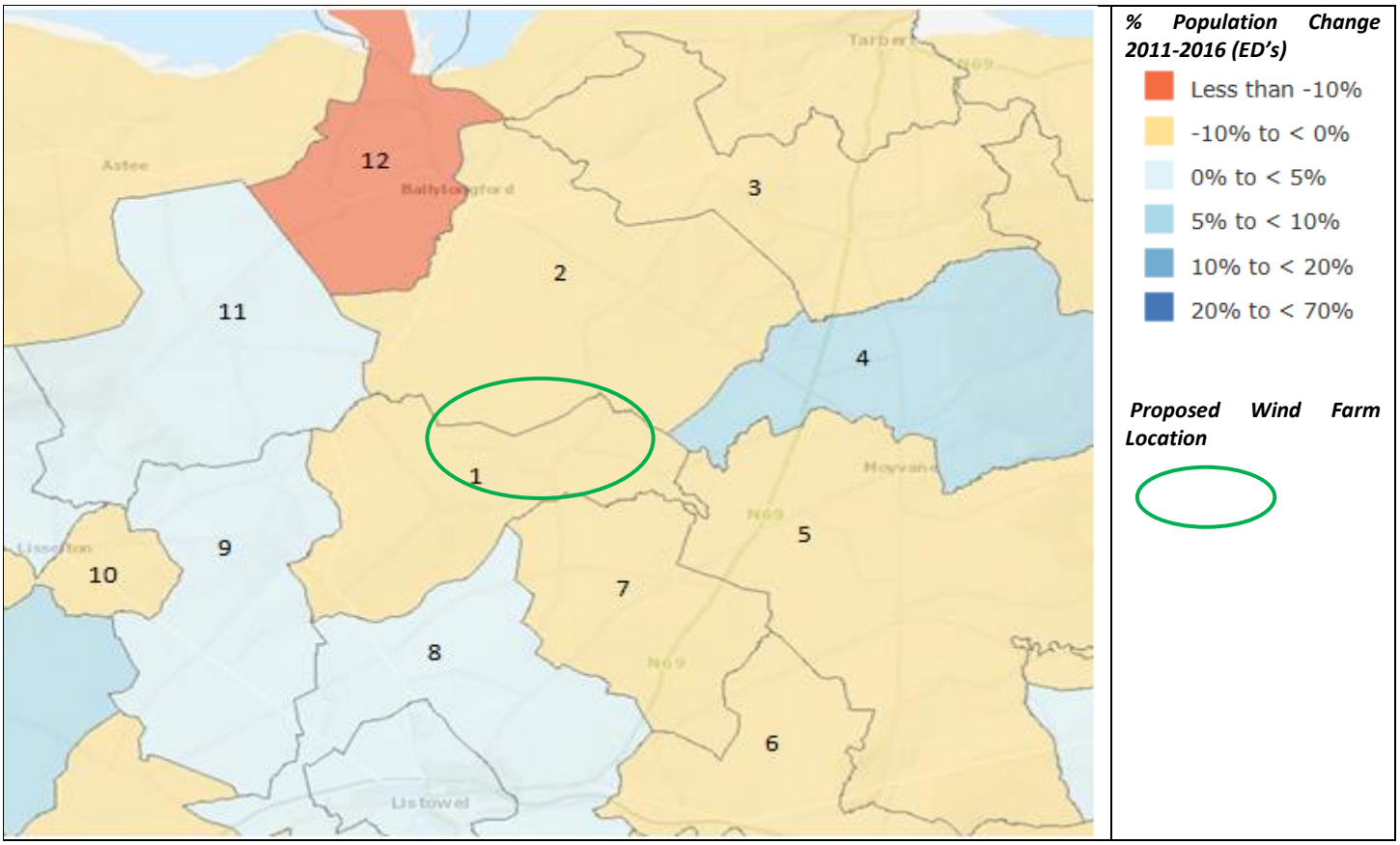


Figure 5-5 % Population Change 2011-2016 (ED's)
Source: ***Adapted from AIRO Census Mapping*** ***http://airomaps.nuim.ie/id/Census2016/***

Table 5-7 Population Trends

Area Ref	Electoral Division	% Change in Population 2011-2016
1	Shronowen	-0.84%
2	Lislaughtin	-6.4%
3	Tarmon	-8.6%
4	Leitrim	6.5%
5	Newtownsandes	-5.0%
6	Kilmeany	-0.9%
7	Cloontubbrid	-3.9%
8	Listowel Rural	1.1%
9	Gunsborough	3.6%
10	Ballyconry	-5.4%
11	Lisselton	4.5%
12	Carrig	-11.6%

5.2.5 Public Health

The 2016 Census also provided information on the general health profile of the population for each small area. The statistics show that, overall, the local population has good health with only between 1-3% of the proportion of the population in the Study Area reporting to have 'bad' or 'very bad' health. See **Table 5-8** below.

Table 5-8 Health Statistics 2016 - % Population Bad or Very Bad – Health

CSO SMALL AREA		Electoral Division	Total Population	% Bad Health	% Very Bad Health
1	**077152001**	Shronowen	237	1.7	0.0
2a	**077125001**	Lislaughtin	230	1.3	0.0
2b	**077125002**		188	0.5	0.5
2c	**077125003**		169	0.6	0.0
3a	**077158001**	Tarmon	237	3.4	0.8
3b	**077158002**		239	1.3	0.0
4a	**077123001**	Leitrim	293	0.7	0.0
4b	**077123002**		252	0.4	0.0
5a	**077142001**	Newtownsandes	267	0.4	0.0
5b	**077142002**		199	2.0	0.0
5c	**077142003**		207	2.4	0.0
5d	**077142004**		148	3.4	0.7
5e	**077142005**		197	0.5	0.0
6a	**077109002**	Kilmeany	210	1.0	0.5
6b	**077109003**		274	2.6	0.0
7	**077051001**	Cloontubbrid	322	1.6	0.0
8a	**077127005**	Listowel Rural	312	3.2	0.3
8b	**077127004**		175	1.1	0.0
8c	**077127007**		244	1.6	0.0
8d	**077127006**		234	0.0	1.3
8e	**077127002**		253	3.2	1.2
9a	**077086001**	Gunsborough	179	0.6	0.6
9b	**077086002**		199	0.0	1.5
10	**077014001**	Ballyconry	146	0.7	0.0
11a	**077126001**	Lisselton	200	1.5	0.5
11b	**077126002**		169	1.2	0.0
12a	**077041001**	Carrig	178	1.1	0.6
12b	**077041002**		173	2.3	0.6

5.2.6 Economic Activity

According to the 2016 Census employment statistics for the region, the work force is employed in a diverse range of industries. The statistics show that the highest level of employment is within the Public administration /Professional services category with approximately 27% of the workforce within the Study Area employed in this category. Other key employment sectors include Commerce and Trade (22%), Manufacturing (20%) and Agricultural (19%). Refer to **Table 5-9**.

A review of the 2016 commuter flow data suggests that there is a level of employment in the locality, with approximately 20% of commuter flows travelling into the area to work. However, the majority of persons (80%) work outside of the area in which they live. This would suggest that the larger urban centres are the principal employment centres for the area. These towns provide employment in the manufacturing, services and professional sectors. Refer to **Table 5-10**.

Table 5-9 Small Area Population Employment Statistics - % Persons at Work by Industry 2016

CSO SMALL AREA Code		Electoral Division	% of Workers					
			Agriculture, forestry, fishing	Building and construction	Manufacturing industries	Commerce and trade	Transport / Communication	Public admin/ Professional Services
1	077152001	Shronowen	30.8	2.2	7.7	14.3	3.3	26.4
2a	077125001	Lislaughtin	29.7	5.5	16.5	13.2	2.2	22.0
2b	077125002		3.3	8.3	16.7	26.7	5.0	18.3
2c	077125003		21.1	2.6	25.0	13.2	2.6	21.1
3a	077158001	Tarmon	22.9	7.2	21.7	14.5	1.2	22.9
3b	077158002		15.9	5.7	21.6	13.6	5.7	27.3
4a	077123001	Leitrim	14.3	8.4	17.6	21.8	2.5	27.7
4b	077123002		15.0	12.0	26.0	10.0	3.0	19.0
5a	077142001	Newtownsandes	30.8	6.0	7.7	19.7	4.3	23.1
5b	077142002		24.1	3.8	19.0	8.9	2.5	22.8
5c	077142003		7.2	4.3	20.3	27.5	4.3	15.9
5d	077142004		11.4	0.0	17.1	28.6	1.4	24.3
5e	077142005		24.4	9.3	11.6	17.4	4.7	10.5
6a	077109002	Kilmeany	5.2	3.1	18.8	17.7	5.2	29.2
6b	077109003		19.4	6.8	7.8	12.6	4.9	24.3
7	077051001	Cloontubbrid	12.5	7.7	24.0	17.3	1.0	25.0
8a	077127005	Listowel Rural	9.7	3.5	15.9	26.5	3.5	26.5
8b	077127004		2.7	5.4	20.3	28.4	2.7	23.0
8c	077127007		5.7	9.2	20.7	21.8	2.3	24.1
8d	077127006		12.1	6.6	19.8	25.3	6.6	22.0
8e	077127002		7.3	4.2	8.3	18.8	7.3	28.1
9a	077086001	Gunsborough	11.3	4.2	15.5	21.1	7.0	19.7
9b	077086002		18.6	10.0	18.6	8.6	5.7	21.4
10	077014001	Ballyconry	15.0	6.7	8.3	23.3	1.7	23.3
11a	077126001	Lisselton	24.7	3.4	11.2	13.5	2.2	29.2
11b	077126002		18.6	21.4	18.6	10	5.7	21.4
12a	077041001	Carrig	19.4	6.0	16.4	17.9	4.5	17.9
12b	077041002		12.1	9.1	9.1	22.7	1.5	19.7

Table 5-10 Electoral Division Statistics - % Commuter Flows

Area Ref	Electoral Division	Commuter Flows (No. of Persons)		
		Outward Commuters	Inward Commuters	New Flow
1	Shronowen	51	4	-47
2	Lislaughtin	129	17	-112
3	Tarmon	116	2	-114
4	Leitrim	146	9	-137
5	Newtownsandes	235	50	-185
6	Kilmeany	187	35	-152
7	Cloontubbrid	71	46	-25
8	Listowel Rural	422	170	-252
9	Gunsborough	84	17	-67
10	Ballyconry	91	6	-85
11	Lisselton	88	8	-80
12	Carrig	68	21	-47

5.2.7 Land Uses

The lands to be developed as part of the proposed development are predominantly peat bogs. There is evidence that a significant amount of small-scale peat extraction has taken place throughout the site. This was noted from aerial photography and during visits to the site.

There are currently no defined recreational land-uses within or associated with the proposed development lands or in close proximity to the site. During the public consultation process however, it was reported that the existing bog roads are used as amenity walking routes by some local residents, primarily during the summer months.

The predominant land use in the immediate surrounds of the proposed development site is essentially agricultural and, from a visit to the study area, and the visual dominance of the agricultural industry, as indicated by land use practices and the number of farmsteads in the region, it is evident that agricultural activities are dominant in the region. The predominant farming activities of the area consist of dairy and beef and, to a lesser degree, sheep farming.

In more recent times, forestry has also become an important source of economic gain and has become an alternative or supplementary source of income for many farmers in this region. This is true for the development site with a portion of the lands at the north western edge of the site presently forested for commercial purposes.

Wind energy is another land-use in the wider area and there are currently a number of operational wind farms to the north east and north west of the site.

5.2.8 Tourism and Amenities

North Kerry has many amenities to offer, including spectacular seascapes, beaches and a multitude of ancient sites, churches and field monuments. These include a circular drive around Kerry Head Peninsula which offers scenic panoramas overlooking the Dingle Peninsula and Clare Coast, blue flag beaches and a championship Golf Links at Ballybunion, the heritage town of Listowel, Carrigafoyle Castle situated on the Shannon Estuary at Carrig Island north of Ballylongford village, Aghavallin Church, the Friary of Lislaughtin and a perfectly preserved round tower at Rattoo near Ballyduff.

A number of walking trails exist locally, including the Sive Walk, located approximately 7km to the south-west of the proposed development site and approximately 1.5km to the west of Listowel. Other walking routes include Carraigafoyle Castle walk, located 7km to the north of the site, and John F. Leslie Woodland Walk, located 9km to the north-east of the site.

There are however, no significant economic benefits of the tourism industry apparent within the study area. With no man-made or significant natural attractions, the area itself has little to offer in terms of visitor attraction. Notwithstanding this, minor economic benefits of the tourism industry do exist for those renting or providing accommodation for visitors wishing to enjoy a more remote setting while visiting the region.

5.3 LIKELY SIGNIFICANT EFFECTS

5.3.1 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 between 60 and 80 temporary jobs will be created during the construction phase of the project, and 20 permanent jobs will be created during the operational phase of the project[1] (SEAI, 2020). 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 impact on population numbers.

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 positive long-term effect on population and settlement in the region. Further details in **Chapter 1** of this EIAR.

Additionally, annual rates payments from the project will contribute substantial funds to Kerry County Council over its lifespan, which will be redirected to the provision of public services within Co. Kerry. These services include provisions such as road upkeep, fire services, environmental protection, street lighting, footpath maintenance etc. along with other community and cultural support initiatives.

5.3.2 Economic Activity

During the construction phase, aggregates and concrete supply for road 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. Therefore, the proposed development would have a positive direct short-term effect on the local economy. During operation, the proposed development has potential to have a positive direct long-term effect on the local economy from monetary contributions associated with the community fund and annual rates.

5.3.3 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 to 80 full time equivalent (FTE) roles, which will have a positive, if short-term, impact on employment. In the long-term, the development is expected to generate full-time employment for 20 persons during its operational phase; however these may not be all locally based (SEAI, 2020).

[1] SEAI (2020) A Macroeconomic Analysis of Onshore Wind Deployment to 2020 An analysis using the Sustainable Energy Economy Model

5.3.4 Land-use

All new development proposals have the potential to affect 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 of the wind farm project, access into and through the Shronowen Bog will remain open to the general public and turbary rightsholders, except for in areas where construction is actively taking place. The areas surrounding the turbines, hardstands, blade set down areas, substation, met mast, site compounds and peat deposition areas will be securely fenced for the duration of the 18-month construction period for health and safety purposes.

Access to the existing bog road infrastructure will be restricted while upgrades are carried out to these roads. These upgrades will take place over a three-month period and will be scheduled so as not to interfere with turbary access during peat harvesting season. This will be a temporary measure and is driven by health and Safety legislation and requirements. Once construction works are completed, full access will be re-established, and at that point in time there will be a new and improved road network throughout the bog along with new improved access points from local roads.

Access may also be restricted to turbary owners at times of heavy site activity such as components delivery and concrete foundation pouring. Traffic procedures and impact mitigations within, through and around the Shronowen Bog 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.

Once operational, the wind farm will have full, open and improved access to all users, landowners and to people who have turbary rights.

Outside of the proposed development footprint, it is not envisioned that land use activities would be adversely impacted.

Once operational, conventional peat extraction activities on remaining turbary plots will resume and continue to take place at the site independent of the proposed development. During operation it is considered that the proposed development would not constitute significant negative impacts 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 future land-use is consistent with current wind farm developments on nearby lands.
- 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 severance, loss of rights of way or amenities as a result of the proposed development.

- In terms of impacts 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.

Overall, it is considered that, during the construction phase, there is likely to be a moderate negative impact on land use and access within the development lands. Similarly, during decommissioning there is likely to be temporary disruptions to land-uses and access. Impacts would be temporary and not significant. During operation it is considered that the proposed development would have a neutral impact on land-uses.

The requirement to fell forestry and replant on another site would be an indirect impact of the proposed development. The total area of forestry to be felled is 3.15 hectares (Ha). The proposed replanting site is located within an area of improved agricultural lands, is in private ownership and there will be no severance, loss of rights of way or public amenities due to afforestation of these lands. Given the marginal nature of the replant lands and the relatively small area to be planted, the impact of the change of use from agriculture to forestry is not considered significant.

5.3.5 Tourism and Amenities

While tourism is a major economic driver in Kerry, no significant economic benefits of this industry are directly associated with the proposed development lands. The proposed development site is not currently used as a 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 tourist attractions specifically pertaining to the proposed development site, there are no direct impacts associated with the construction phase of the proposed development.

The location of the proposed development away from major tourist attractions 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 14 – Cultural Heritage**. The assessment concluded that there will be no impacts on the wider archaeological and cultural heritage landscape as a result of the proposed development.

5.3.6 Visual Effects

A landscape and visual impact assessment was carried out in relation to the proposed project. Refer to **Chapter 13 – Landscape and Visual**. A total of twenty (20) viewpoints were used to determine the visual impact of the proposed wind farm and associated grid connection. From these viewpoints, photomontages were prepared and a written assessment completed. The assessment considered the effects of the development on the landscape as a resource and on the fabric and character of the landscape and visual effects which relate to the change in views and visual amenity experienced by groups of people. The study area spans a 20km radius from the proposed turbines, while the ZTV extends to 30km from the turbines. The assessment also considered the visual effects from key tourism and recreational locations in the area such as recreation trails including the Wild Atlantic Way,

Scenic Routes and Prospects and Landscapes and Cultural Heritage features designated in the Kerry County Development Plan. The effects on local residents and local community views are also assessed.

The assessment found that the landscape value of the actual site and the immediate environs (extending to 5 kilometres of the site), an area of flat peatland within primarily agricultural land, with a number of existing wind turbines, is considered to be Low-Medium in value. The area is not subject to any specific landscape designations and is zoned Rural General. The wider landscape (between 5-20km) contains a number of elements which appear valued. These include several scenic routes and designated landscapes. The change to the landscape character in the immediate vicinity of the site is considered to result in Moderate, and adverse effects in parts of this area, particularly to the east where the character is more open. It is however noted that wind farms and electricity generation are features of the landscape. However, the effects on the areas of more sensitive landscape in the wider area are considered to be less pronounced and range from Not Significant to Slight. The Shannon Estuary (particularly the Co. Clare coastline) is a sensitive landscape but also an industrial one in some areas.

In terms of visual effects, given the size of the turbine structures and their proposed position within relatively open flat terrain, a visual impact 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 the perception of the person viewing them. The assessment found that the majority of the views (14) resulted in Not Significant, Slight or Slight to Moderate visual effects. One view (Viewpoint 13) resulted in no visual effects. Out of 20 views, four were considered to have an Adverse quality, while the remainder were considered Neutral in quality. These four views range from Moderate to Significant and are extremely localised, within 2km of the site. No significant visual effects result from any designated viewpoints/scenic routes (or designated landscapes) within the study area, including in Co. Clare along the Shannon Estuary. One scenic view (Viewpoint 9) was considered to undergo a Moderate and Neutral visual effect as a result of the proposed turbines. Further details are provided in **Chapter 13 – Landscape and Visual**.

5.3.7 Health and Safety

5.3.7.1 Safety

While there is the potential for construction related hazards, serious risks to human health and safety are not envisioned. 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, as amended;
- Safety, Health & Welfare at Work Act 2005, as amended;
- Safety, Health & Welfare at Work (General Applications) Regulations 2007 to 2020; and
- Irish Wind Energy Association Best Practice Guidelines.

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.

The rigorous safety checks imposed on the turbines during design, construction, commissioning and operation ensures the risks to humans are negligible.

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 and be enclosed in the sub-station site with secure fencing (2.4m steel palisade fence) and appropriate signage.

Access to the turbines and the substation will be controlled during operation to ensure the public are restricted for their safety.

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 beyond fall over distances that would present a risk of significant accidents.

Overall, the project will have a net benefit on human health in the long term by contributing to the production of clean renewable energy.

5.3.7.2 Health and Well Being

Construction works and new development not only can pose safety risks but can also 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. Nuisances such as noise, dust and traffic are potential factors for the devaluation of amenity.

The following potential negative well-being and nuisance effects of the proposed development on the local human environment have been identified:

- Dust emissions from construction and decommissioning activities
- Noise emissions during construction activities and operation
- Visual impacts during operation
- Shadow flicker during operation
- Traffic nuisance 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 Nuisances issues and relevant assessment

Development Phase	Potential Nuisance / Health & Safety Issue	Addressed In EIAR Chapter
Construction Phase	Noise emissions and vibration	Chapter 11
	Dust emissions	Chapter 10
	Traffic nuisance	Chapter 15
Operational Phase	Noise emissions and vibration	Chapter 11
	Visual impacts	Chapter 13
	Air quality impacts	Chapter 10

	Shadow Flicker nuisance	Chapter 12
Decommissioning	Traffic nuisance	Chapter 15
	Noise emissions and vibration	Chapter 11

Air Quality

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 negative impacts 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 are not likely to exceed the recommended TA Luft 350mg/m3/day guide-limit. There is, however, the possibility of nuisance dust occurring in the vicinity of the site entrances and along the local public road which could affect road users. This is considered to result in temporary slight negative effects and mitigation in the form of dust management during construction will be needed. Refer to **Appendix 2-1 – Construction Environmental Management Plan (CEMP).** With the effective implementation of standard dust management measures to control and reduce dust no significant negative effects, in terms of a community nuisance is likely to occur.

Noise:

The HSE position paper 2017 states that "*There is no direct evidence that exposure to wind farm noise affects physical or mental health*". There is no direct evidence that considered possible effects on health of infrasound or low-frequency noise from wind farms. The WHO (1995) states that "*There is no reliable evidence that infrasound below the hearing threshold produce physiological or psychological effects*".

While there is no reliable published scientific evidence that demonstrates a direct causal link between people living in proximity to modern wind turbines, the noise they emit and resulting physiological health effects, wind turbine noise can be a source of annoyance for some people.

Chapter 11 of this EIAR considers the effects of potential noise emissions from the proposed development in accordance with the current applicable guidelines.

The wind farm construction phase has the potential to generate noise emissions which could 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 acceptable construction noise limit at any dwelling location, for the duration of the construction phase. The noise assessment makes recommendations regarding measures to reduce the amount of noise emissions during construction, which will be adopted by the appointed contractor. Refer to **Appendix 2-1 – Construction Environmental Management Plan (CEMP).** Overall, construction activities will have a temporary negligible effect and noise generated from construction traffic will have a temporary slight negative effect. Therefore, overall construction related activities will have a temporary slight negative effect.

Once operational, the wind turbines and the substation facility will generate noise which will propagate into the receiving environment.

The results of the noise assessment show that the proposed wind farm can meet the noise limit criteria as set out in the 2006 DoEHLG Wind Energy Planning Guidelines both as a standalone development and cumulatively with the existing operational and permitted developments in the area at the nearest noise sensitive receptors.

At all locations and at all wind speeds the predicted noise emissions do not exceed the derived limit criteria for both the quiet daytime and night-time periods.

Therefore, considering adherence to the national guide limits, the local population is unlikely to experience significant negative effects from noise.

The proposed substation will be partially screened by an engineered soil berm which will be fully planted to provide visual screening and noise dampening or suppression. The berm will act as a direct impediment to any noise emissions. In addition, the main noise generating equipment is located at the most northerly end of the substation and is significantly away from any potential receptors and at that distance combined with the berm and low noise generation poses minimal risks. Whilst the noise impact assessment predicts that operational noise will not exceed noise limit criteria set out in the current wind energy guidelines, this mitigation measure will ensure that operational noise emissions will be minimised.

Decommissioning is likely to result in less noise than during construction of the proposed development. The overall construction phase has been considered to have slight negative effects, therefore decommissioning will, in the worst case, also have slight negative effects.

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 impacts on surrounding dwellings. The modelling undertaken, assumes a worst-case scenario, and has determined that four (4) properties could theoretically experience potential shadow flicker exceeding threshold values greater than the 30 hours per year and twenty-one (21) 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. This would be a long-term significant impact for these locations. However, with the implementation of additional turbine management measures to shut-down operations at critical times the proposed development would have zero shadow flicker effect on residential dwellings. Therefore, the proposed development with additional turbine management measures, will not have significant negative effects on nearby dwellings as a result of shadow flicker. Refer to **Chapter 12 Shadow Flicker** for further details.

Traffic and Road Usage

Potential impacts on the surrounding road network will arise principally during the construction phase. Peak heavy vehicle traffic volumes generated by the delivery of construction materials will be up to 227 heavy vehicles per day, both to and from the site. Highest peak hour heavy vehicle traffic volumes will be up to 19 heavy vehicles, both to and from the site. 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 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. 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.

Visual Impacts

Discussed in Section 5.3.6.

The proposed substation will be partially screened by an engineered soil berm which will be fully planted to provide visual screening and this will increase as the vegetation and trees mature over time. The height and bulk of the berm will provide a visual screen from the local road and nearby residences.

5.3.8 Cumulative Effects

Any cumulative effect with existing developments is incorporated in the impact assessments sections of the individual topic areas/chapters. A list of planned and approved/permitted developments assessed in the EIAR for cumulative impact with the proposed development is provided in **Chapter 2 - Project Description**. The developments considered, and the extent to which there may be a cumulative impact, are dependent on the individual topic area.

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.

In considering cumulative effects with other planned or approved projects, construction activities may 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 noise, traffic and air quality impacts 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. Therefore, there is limited potential for cumulative noise and air quality effects with other planned or approved projects. Any cumulative traffic effects/impacts on the local road networks due to construction works associated with possible developments would be temporary and short-term. Consultation will be undertaken with Kerry County Council and local residents to ensure that cumulative effects with other projects would be minimised. Overall, it is considered unlikely that any cumulative effects with other projects due to construction works would result in long term significant impacts on Population and Human Health.

The noise impact from existing developments is addressed in the background noise surveys. No other additional approved projects have been identified in the study area that might produce cumulative

noise and vibration impacts to sensitive receptors (refer to **Chapter 11 – Noise**). Consultation will be undertaken with Kerry County Council and local residents to ensure that any potential cumulative effects with other projects would be minimised. Overall, no significant cumulative operational noise effects have been determined.

Shadow Flicker Control Measures will ensure no shadow flicker results from the proposed development. Therefore, there is no potential for cumulative shadow flicker effects with existing or approved neighbouring wind farm developments.
Operation of the proposed development will not result in any signification 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 impact of the proposed development along with other planned or operating wind turbines in the area. Viewpoints close to the site are likely to experience the most pronounced visual effects as there are several wind farms in relatively close proximity. Combined – 'in combination' effects and 'in succession' effects are likely to arise, but sequential views will also be experienced. Cumulative visual effects resulting from the addition of the proposed turbines are not considered to be significant in views representing sensitive receptors the wider landscape.

5.4 MITIGATION

The potential for significant impacts on the human environment will principally arise during the proposed development's construction phases from traffic, noise and dust, and during the wind farm operational phase from noise and shadow flicker and will need to be addressed. Mitigation in relation to these issues are outlined in their respective Chapters of this EIAR (refer to **Chapter 15 Material Assets; Chapter 10 Air and Climate; Chapter 11 Noise and Vibration; Chapter 12 Shadow Flicker**). No additional mitigation is proposed here.

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.

5.5 RESIDUAL IMPACTS

- With the implementation of mitigation measures, noise nuisances will be kept to a minimum and within acceptable noise limits.
- With the implementation of mitigation measures, there will be zero potential for shadow flicker effects.
- With the implementation of standard traffic management measures, traffic nuisances will be kept to a minimum.
- With the implementation of mitigation measures, significant health and safety implications are not envisioned.
- With the implementation of standard best management construction activities, dust levels will remain within recommended acceptable guide-limits.

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

5.6 CONCLUSION

As with any development, construction activities can cause a nuisance to the local community and are likely to pose temporary minor disturbances socially. The most notable of these disturbances relates to the generation of additional traffic on the local networks, generation of noise and safety implications. However, 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 negative impacts on the local human environment are expected.

There are no predicted major adverse operational impacts associated with the proposed wind farm development which would significantly negatively impact on the local community. The project will

produce renewable electricity in an environmentally-friendly manner thereby avoiding the risk of air pollution and thus risk to human health.

In terms of impacts 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 proposed development. There will be no severance, loss of rights of way or amenities as a result of the proposed development.

Noise emissions are not considered to be significant. The noise assessment shows that the proposed wind farm would be able to operate within the recommended noise limit criteria in the current applicable Wind energy planning guidelines for all third-party properties and thus will not adversely impact on the quality of life of local residents and the existing relatively tranquil environment in which they live. The wind farm will be operated and managed with the aim of minimal impact on the human environment and the local residents.

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

Given the size of the turbine structures and their proposed position within an open low-lying area, a visual effect 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. Moderate to Significant impacts will be experienced at four viewpoints however these are extremely localised, within 2km of the site. No significant visual effects result from any designated viewpoints/scenic routes (or designated landscapes) within the study area.