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6 POPULATION AND HUMAN HEALTH

6.1 Introduction

This chapter of the EIAR assesses the potential impacts and resulting effects likely to occur as a result of the construction, operation and decommissioning of the Proposed Development on the population in the area together with the effects on human health.

The Proposed Development comprises an 11-turbine wind farm on a site located within forested and agricultural lands. It also comprises a Grid Connection Route (GCR) for connection to the national grid, and temporary accommodating works along a Turbine Delivery Route (TDR) to the wind farm, to facilitate the delivery of large components from the port of delivery. The GCR and TDR are both assessed in this EIAR and form part of the planning application.

The key components that are described throughout the EIAR are listed below:

- The wind farm which consists of 11 wind turbines (4 turbines across the Eastern Development Area (Eastern DA) and 7 turbines across the Western Development Area (Western DA));
- The grid connection route and underground cables (also referred to as GCR and UGC); and,
- The turbine delivery route (TDR).

The term 'Proposed Development' collectively describes the above three components. Further information about the Proposed Development is presented in **EIAR Chapter 5: Project Description.**

6.2 Statement of authority

This chapter was prepared by Laurie McGee, Principal Environmental Consultant with RSK Environment Limited. Laurie is a corporate member of the Irish Planning Institute and the Royal Town Planning Institute and has over 30 years of experience in town and environmental planning consultancy. Laurie has considerable experience in onshore wind energy EIA and planning in a previous role as a Consultant Town Planner and EIA Project Manager, having worked on multiple wind farms in Northern Ireland and Northwest Ireland including preparation of Population and Human Health chapters. Harry Reynolds, Graduate Environmental Consultant from Nicholas O'Dwyer assisted with preparation of this EIAR chapter, including conducting desktop research for the description of the baseline and updates to the database of potential sensitive receptors and preparing the figures for this chapter. Harry has a Bachelor of Science (Hons) in Environmental Science from Atlantic Technological University, Sligo. In 2022, he won the Academic Excellence award for the highest overall marks in his department, and the ESAI Undergraduate of the year award for his thesis titled 'The Utilization of Wildflower Pollen as an Environmental Indicator of Atmospheric Pollution'.

6.3 Methodology

This chapter has been completed having regard to the following:

- European Union, Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (2017);
- Environmental Protection Agency, Guidelines on the information to be contained in Environmental Impact Assessment Reports (May 2022);
- Environmental Protection Agency, Advice Notes for Preparing Environmental Impact Statements (Draft, September 2015);
- Department of Housing, Planning and Local Government, Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018);
- Institute of Environmental Management and Assessment, 'Effective Scoping of Human Health in Environmental Impact Assessment' (2022);
- Institute of Environmental Management and Assessment, 'Determining Significance for Human Health In Environmental Impact Assessment' (2022); and
- Department of Housing, Local Government and Heritage, Wind Energy Development Guidelines (2006).

In relation to population, this chapter considers the potential direct and indirect effects of the Proposed Development on human beings living, working, and visiting in the vicinity of the site. To provide a clear assessment of potential impacts and effects, this chapter describes the demography, employment aspects and visitor attractions of the receiving community.

In relation to Human Health, the European Commission (EC) has published Guidance on the Preparation of the Environmental Impact Assessment Report (2017). This document defines human health as *"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"*.

The EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2022) states that the EIAR should assess the potential impacts on population and human health under the environmental categories addressed elsewhere in the EIAR, using the source-receptor pathways of air, water and soil and other health and safety issues as relevant.

Accordingly, the potential impacts of the Proposed Development on the population and human health of the study area have been assessed, considering the conclusions (i.e., the residual effects and their significance) from other chapters of this EIAR including:

- Chapter 9 Hydrology and Hydrogeology
- Chapter 11 Material Assets.

- Chapter 12 Shadow Flicker
- Chapter 13 Noise and Vibration
- Chapter 14 Landscape and Visual
- Chapter 16 Traffic and Transport
- Chapter 17 Air Quality
- Chapter 18 Climate

6.3.1 Study area

The study area for the Population and Human Health chapter encompasses the proposed wind farm site, the grid connection route (GCR), and the turbine delivery route (TDR) as shown in **Figure 6.1**. The study area for this chapter is defined by the Electoral Divisions (EDs) of Kilseily, Castlecrine, Cloontra, and Cloghera**.**

The nearest settlements in the study area are shown in **Figure 6.2,** and include Broadford to the north, Sixmilebridge to the west, and Meelick, Parteen and Ardnacrusha to the south. Smaller settlements in the vicinity include Kilkishen, Kilmurray, Bridgetown, Cloonlara, and Cratloe.

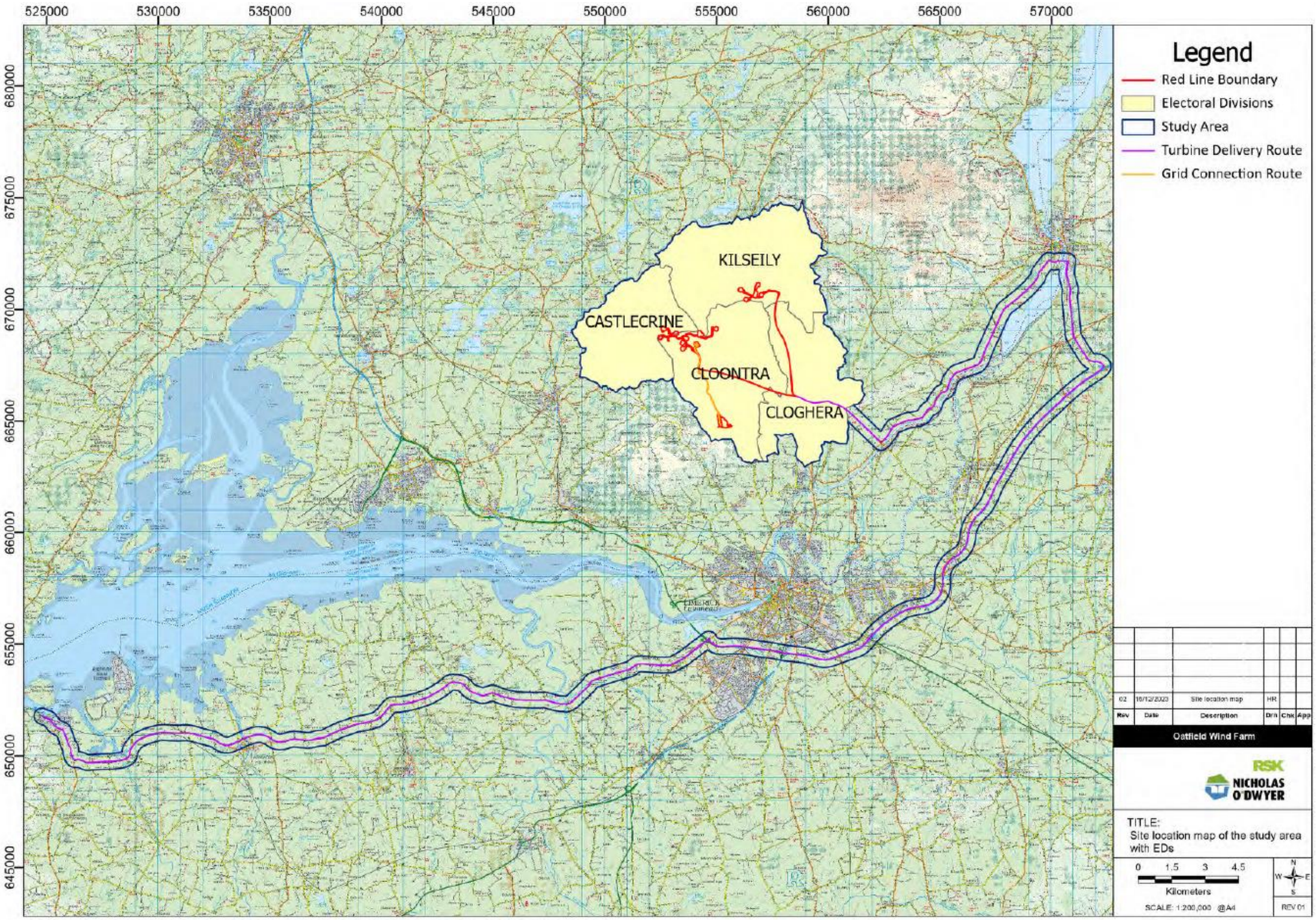

Figure 6.1: Site location map of the study area with EDs

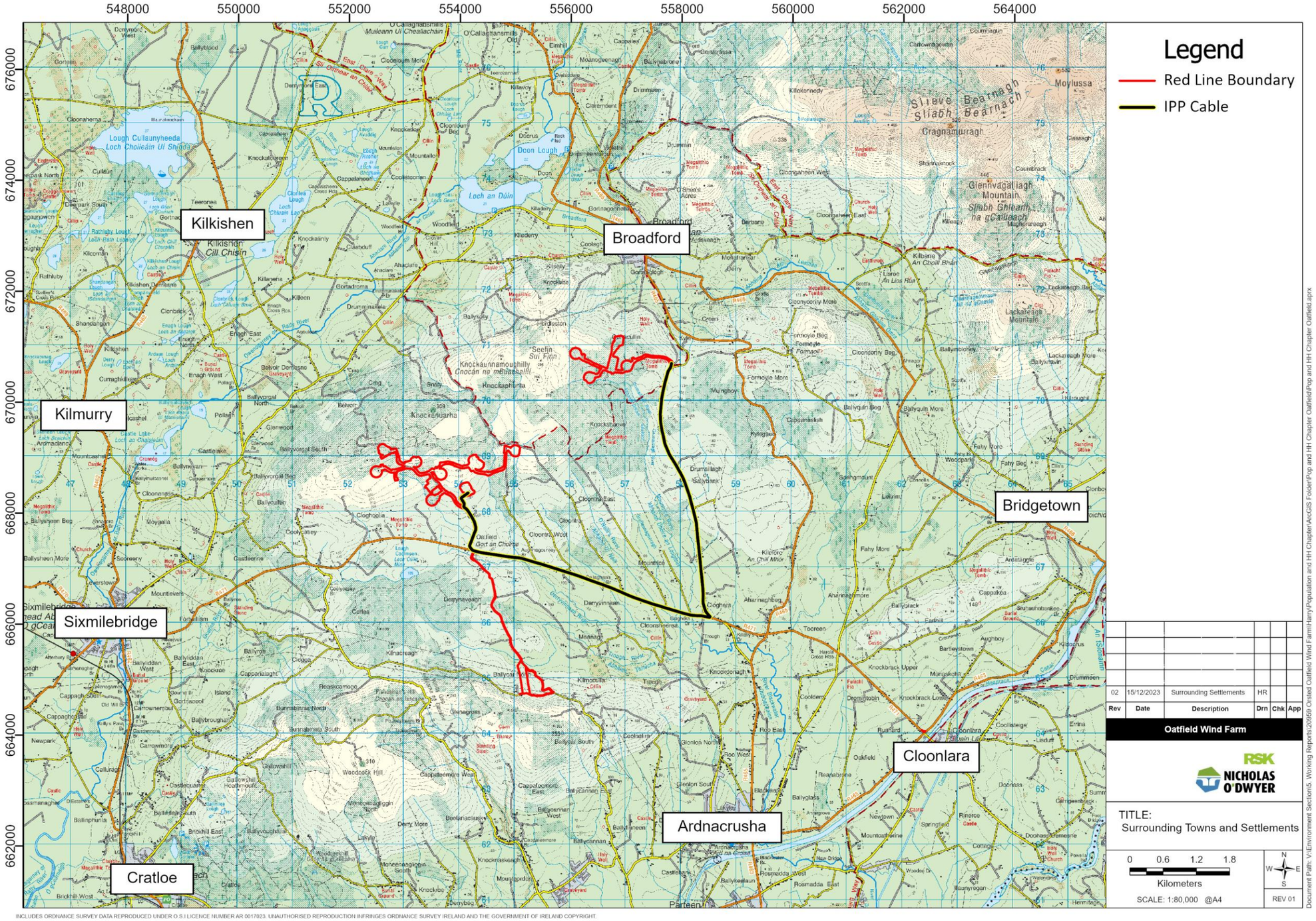

Figure 6.2: Proposed Development and surrounding towns and settlements

6.3.2 Information sources

The assessment of impacts on population and human health involves the identification of relevant characteristics of the population in the receiving community that may be affected by the proposed development from quantifiable documentary research. The scope of the evaluation is based on a review of data available from the Central Statistics Office (CSO), legislation, guidance documents and any relevant EIARs that are in the public domain. The principal sources of information for this EIAR chapter are:

- Census and employment information published by the Central Statistics Office (CSO). Available at https://data.cso.ie/
- Clare County Development Plan 2023-2029, available at: https://www.clarecoco.ie/services/planning/clarecountydevelopmentplan23-2029/
- Environmental Protection Agency (EPA) Maps, available at: https://gis.epa.ie/EPAMaps/
- EPA spatial data (including Corine Land Cover mapping), available at: https://gis.epa.ie/GetData/Download
- Fáilte Ireland records and spatial data, available at: https://www.failteireland.ie/Research-Insights/Open-data.aspx
- Ordinance Survey Ireland (OSi) mapping and aerial photography along with administrative boundaries spatial data, available at: https://data-osi.opendata.arcgis.com/

A desk-based study was undertaken to gather information regarding population, age structure, economic activity, and employment within the study area. The aim of the desktop study was to determine the current baseline environment. The baseline assessment includes full results from the 2022 Census of Ireland (conducted on Sunday 3rd April 2022) from the Small Areas Population Statistics (SAPS) and Electoral Division level, which were published by the CSO in September 2023[1].

6.3.3 Assessment of effects

The potential significant effects of the Proposed Development before and after mitigation on the Population and Human Health of the study area are assessed based on generalised degrees of effect significance per Figure 3.4 of the EPA EIAR Guidelines (May 2022) (reproduced herein as **Figure 6.3**). This considers the significance/sensitivity of the receiving environment and the character / magnitude / duration / probability / consequences of the effects on a scale that ranges from Negligible to High.

[1] Central Statistics Office, Census 2022 Publication Schedule, https://www.cso.ie/en/census/census2022/census2022publicationschedule/, accessed 20/06/2023.

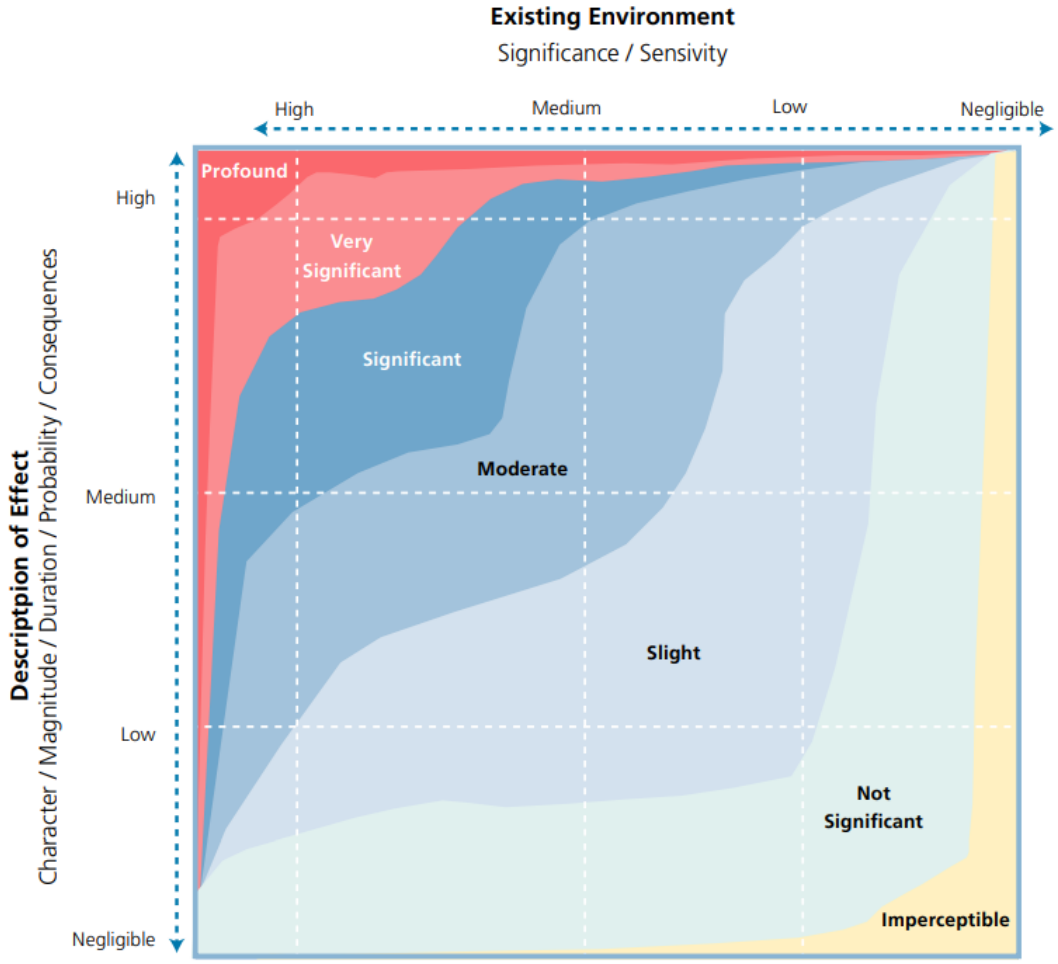

Figure 6.3: Determining significance of effects

6.4 Existing environment

This section describes the baseline of the study area and addresses population, employment, land use, recreation and tourism, human health, and amenity.

6.4.1 Population

6.4.1.1 Population Change

In terms of the County, region and the State, population structure and change in Ireland are more strongly influenced by inward migration and emigration rates than by birth and death rates. The most recent population estimates for the country indicate that the combination of net inward migration and high birth rates has resulted in the population of Ireland reaching 5.1 million in 2022. This is an increase of 8% over the 2016 Census.

Projections for Ireland up to 2051 anticipate a population of approximately 6.03 million in the moderate scenario accounting for fertility rates and net inward migration.[2]

The 2016 Census recorded a total population of 2,055 in the Proposed Development study area as shown in **Table 6.1**. The 2022 Census results shows an increase in the total population for the study area to 2,207. This represents an increase of 152 people (7.4%) from 2016 to 2022. The greatest population increase in the study area from 2016 to 2022 was in Cloontra and Kilseily EDs.

Table 6.1: Population change in the study area 2016 to 2022

Study Area (EDs)	2016 Census	2022 Census	Population change 2016 to 2022	Percentage Change %
CASTLECRINE	467	495	28	6.0%
CLOGHERA	581	586	5	0.9%
CLOONTRA	270	307	37	13.7%
KILSEILY	737	819	82	11.1%
STUDY AREA	**2055**	**2207**	**152**	7.4%

As displayed in **Table 6.2,** according to the 2022 Census results, change in population from 2016 to 2022 (7.4%) is similar to that of County Clare for the same period (7.7%) but less than the State total of 8.1%.

Table 6.2: Population change 2016 to 2022 for study area, County and State

Area	Population		% Population Change
	2016	2022	2016-2022
Study Area (EDs)	2,055	2,207	7.4%
County Clare	118,817	127,938	7.7%
State	4,761,865	5,149,139	8.1%

6.4.1.2 Population Density

Cloontra ED is the least densely populated in the study area of 13 persons per km^2, as seen in **Figure 6.4**. Kilseily ED is the most densely populated with 29 persons per km^2. whereas Templemary ED has only roughly 18 people per km^2. As shown in **Figure 6.5**, the study area is not in a densely populated portion of County Clare. The closest densely populated settlements to the study area in County Clare are immediately south outside Limerick City, to the east in Killaloe, and to the west in Newmarket on Fergus.

[2] Central Statistics Office, Population and Labour Force Projections 2017 – 2051, Population and Labour Force Projections 2017 - 2051 - CSO - Central Statistics Office, accessed December 2023.

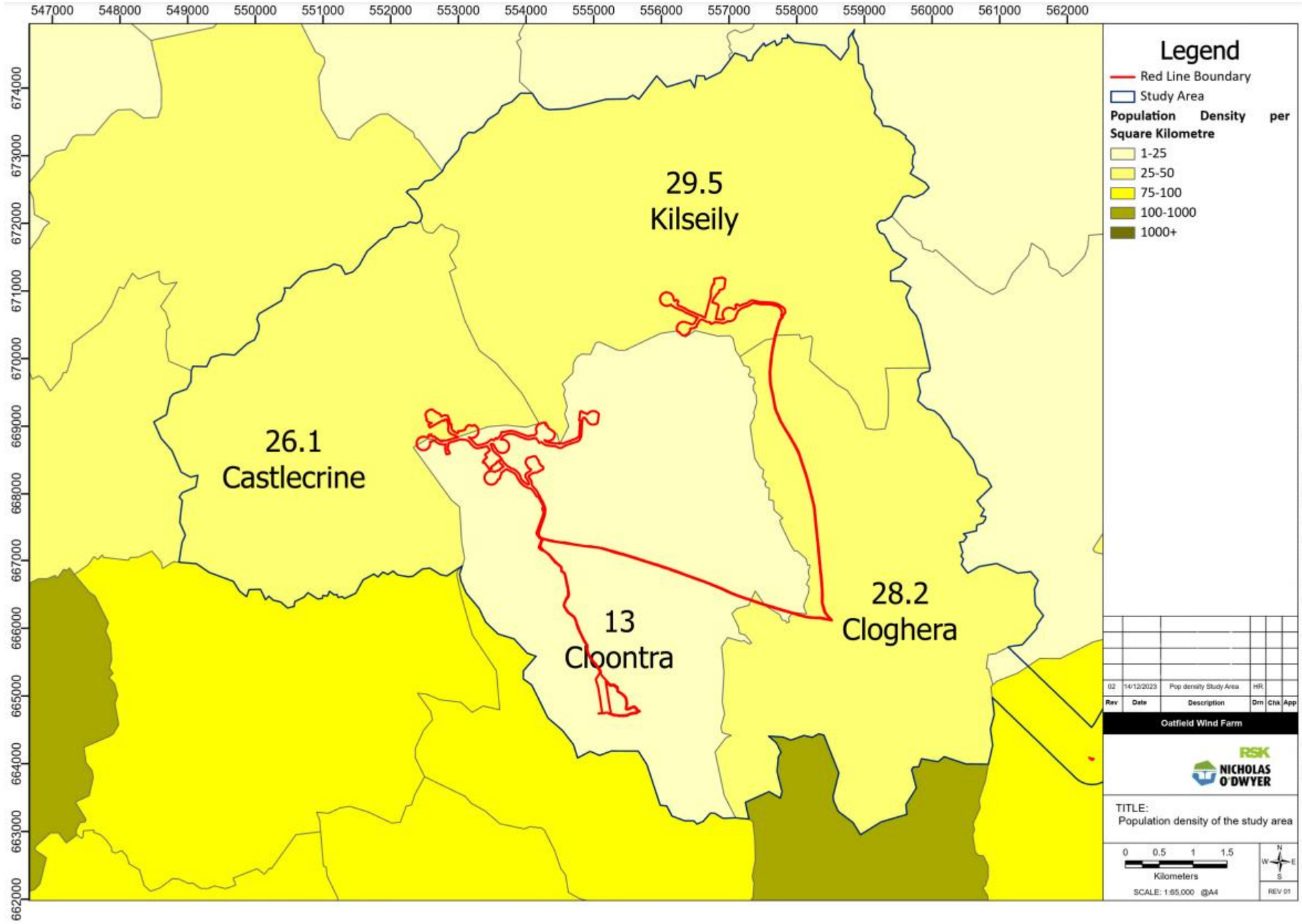

Figure 6.4: Population density of the study area (excluding TDR options and GCR)

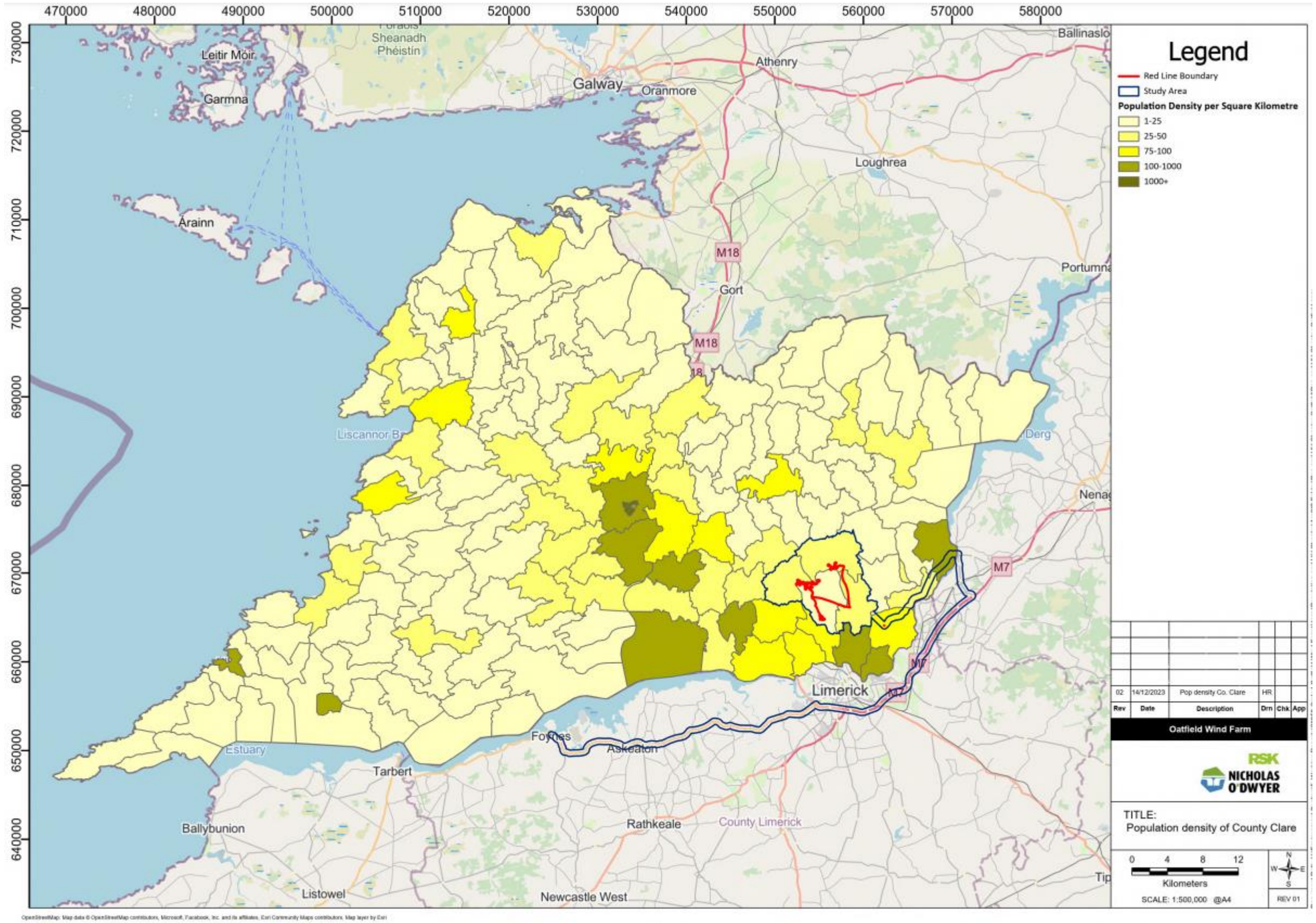

Figure 6.5: Population density of County Clare

6.4.1.3 *Population age cohorts*

Table 6.3 and **Figure 6.6** show the distribution of population among the different age cohorts from the 2022 Census for the study area as compared with County Clare and the state. With the exception of the age cohorts 10-14, 15-19, 45-49, and 50-54, the population of the study area reflects the general population trends in both County Clare and the State.

People aged 45-49 make up most of the population in the study area (9.6%). This is higher than for County Clare (7.4%) and the State (7.2%). The next largest population cohort in the study area, County and State are those aged 10-14. This age group makes up 9.4% of the study area, compared with 7.3% for County Clare and 7.4% for the State. People aged 15-64 (i.e., working age) make up 65.1% of the study area population, which is similar when compared to the County (63.6%) and the State (64.3%) .

Table 6.3: Population age cohorts for the study area, County and State, 2022

Age Cohort	Percentage of Total (%)		
	Study Area	**County**	**State**
0-4	6.0	5.6	5.8
5-9	6.9	6.6	6.7
10-14	9.4	7.3	7.4
15-19	9.2	7.0	6.6
20-24	5.4	5.4	5.7
25-29	3.8	4.7	5.3
30-34	4.5	5.2	6.0
35-39	6.4	6.6	7.2
40-44	6.3	7.6	7.8
45-49	9.6	7.4	7.2
50-54	8.2	7.2	6.7
55-59	5.6	6.6	6.2
60-64	6.1	5.9	5.6
65-69	4.4	5.2	4.9
70-74	3.2	4.6	4.2
75-79	2.7	3.5	3.2
80-84	1.9	2.0	2.0
85+	0.6	1.7	1.8

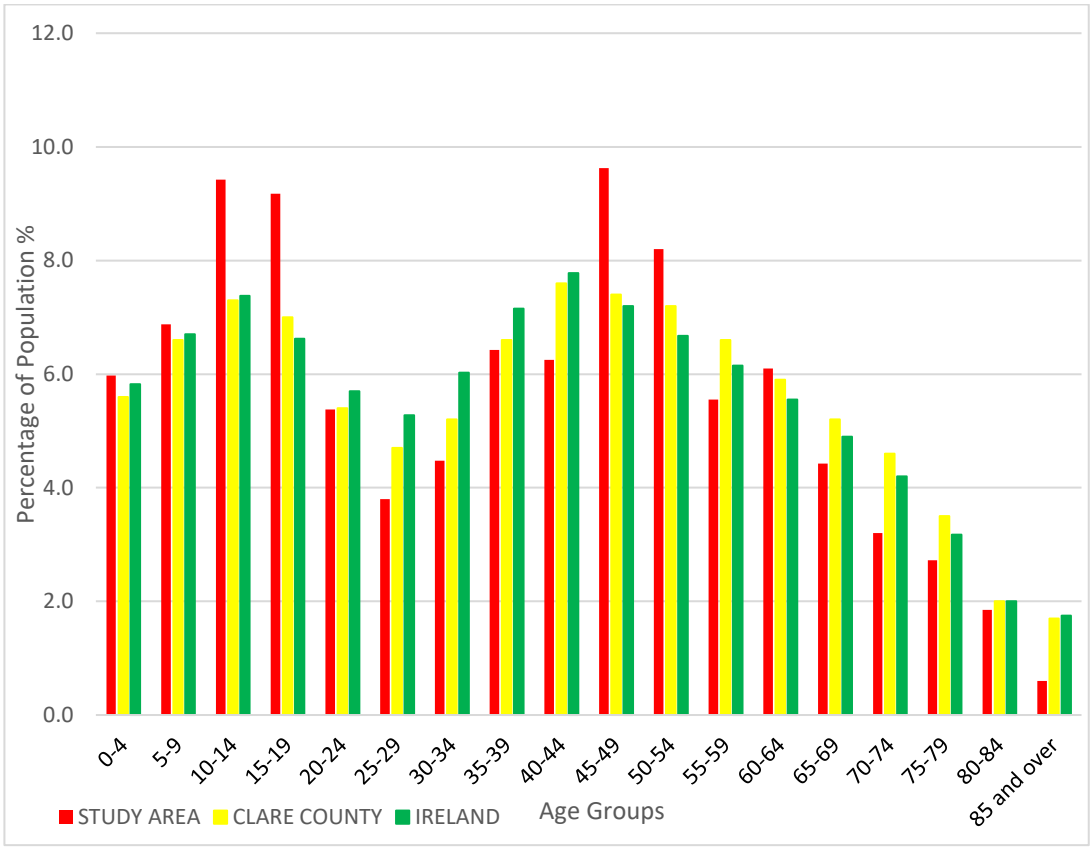

Figure 6.6: Bar chart of age cohorts for study area, County and the state

6.4.1.4 Dependency ratios

The dependency ratio is a measure of the number of dependents aged 0 to 14 and over the age of 65 as a percentage of the total population aged 15 to 64. The dependency ratio is a demographic indicator which gives an insight into the number of people of non-working age (i.e., those aged 0-14 and 65+) compared with the number of those of working age (those aged 15 – 64). The higher the ratio, the less people of working age there are in the area (i.e., those depending on wage earners or the State for support).

As shown in **Table 6.4**, in 2022, the dependency ratio of the study area was marginally less than that for the County and the State. In the study area in 2022, the dependency ratio was 2% lower than the State ratio and 3.4% lower than the County ratio. When looking at the change in the dependency ratio from 2016 to 2022, the dependency ratio of the study area decreased by 6.52%, compared to a .29% increase in the County and 0.92% increase in the State for that period.

For the study area, County and State, the wages of more than half of the population support those of non-working age. When examining the change from 2016 to 2022, the dependency ratio for the study area has decreased, meaning in 2022 there were more people of working age to support non wage earners than in 2016, whereas for the County and State there was virtually no change to the dependency ratio in the period.

Table 6.4: Dependency ratios 2016 and 2022 for study area, County and State

Area	Dependency Ratio 2016	Dependency Ratio 2022	Dependency Ratio change 2016 to 2022
Study Area (EDs)	60.5%	54.0%	-6.52%
County Clare	57.1%	57.4%	0.29%
State	55.1%	56.0%	0.92%

6.4.2 Employment

The work force is defined as the number of people aged 15 -64 who are of working age. CSO data from 2022 shows that 47.0% of people in the study area are of working age in comparison to 43.9% for the County, and 45.1% for the State as shown in **Table 6.5**.

Table 6.5: The workforce in 2022 for the study area, County and State

Area	Work Force (%) of total population
Study Area	47.0%
County Clare	43.9%
State	45.1%

A comparison between County Clare and the study area in terms of the population at work employed in the various Industries according to CSO data records from 2022 is shown in **Figure 6.7.** This indicates that Professional Services, Commerce and Trade and Manufacturing Industries and Other are the three largest sectors in which individuals of the study area and County are employed. There are more employed in Agriculture and Fishing in the study area than the County, and more in Other in the County than in the study area.

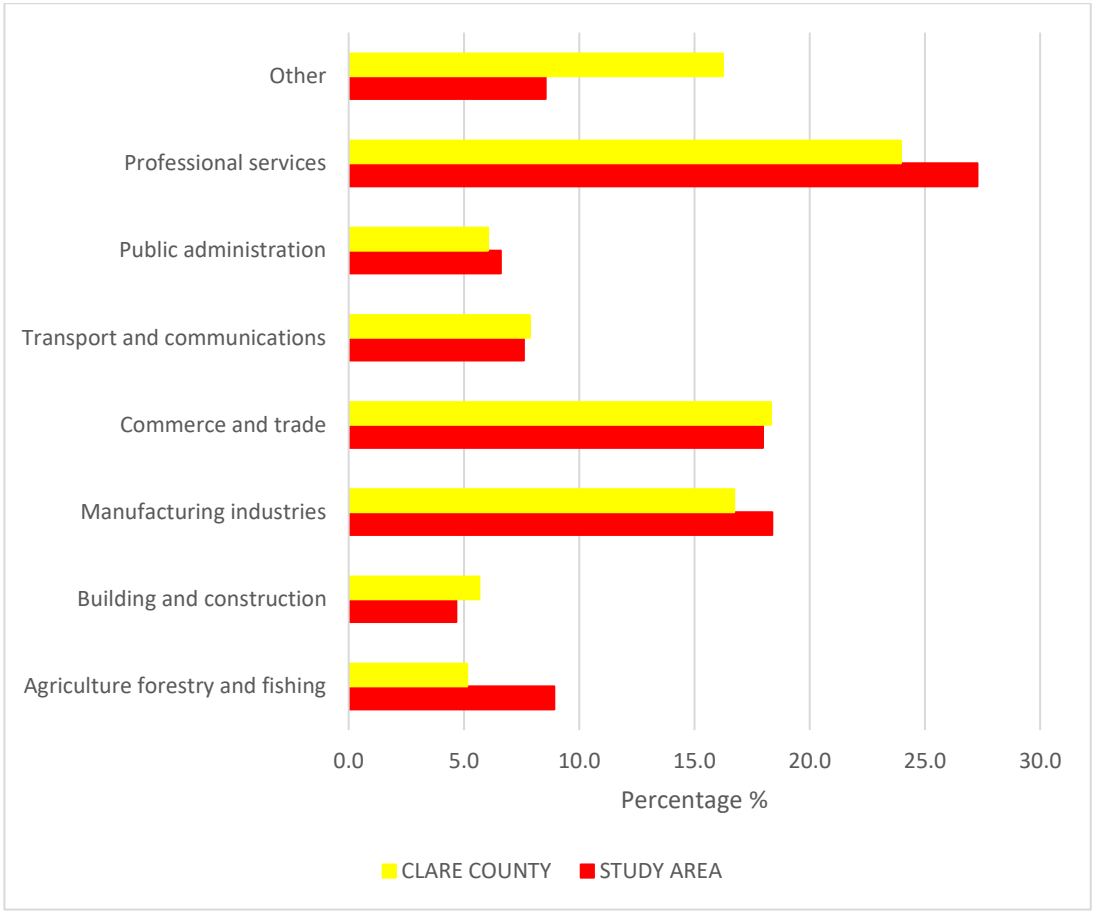

Figure 6.7: Employment by sector for study area and county

As shown in **Figure 6.8, t**he highest percentage of those at work in all EDs within the study area in 2022 were engaged within the Professional Services Industry, followed by Manufacturing Industries for all EDs except for Cloontra, where there are more persons engaged in Commerce and Trade, and which has the highest percentage of persons engaged in Agriculture, forestry and fishing.

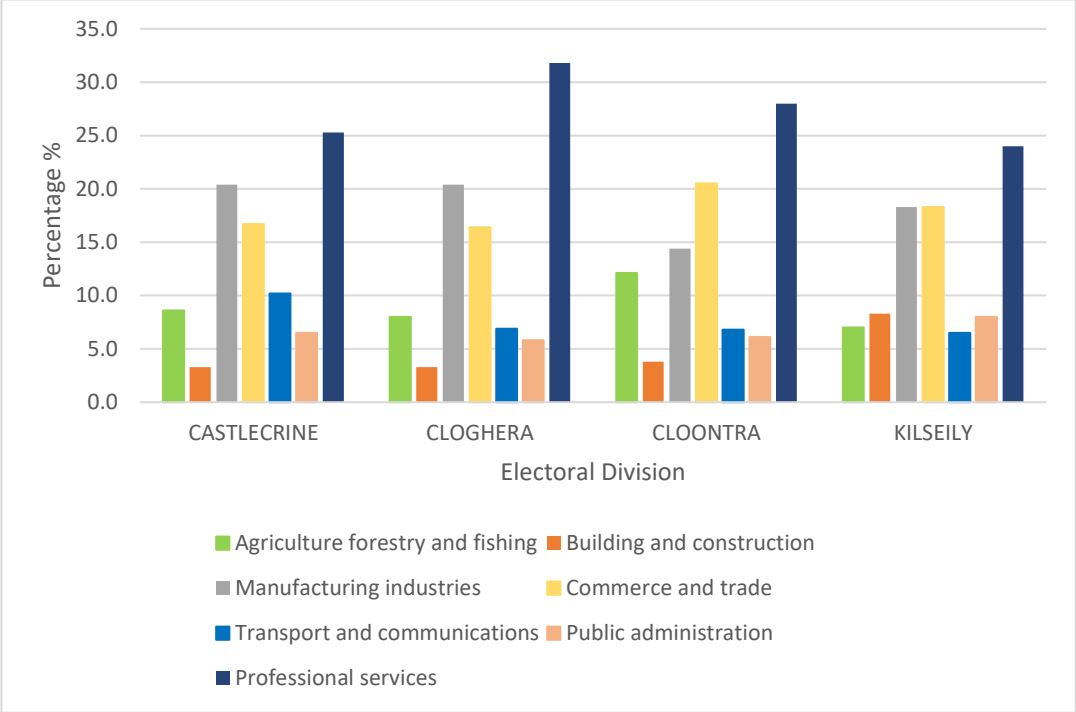

Figure 6.8: Employment by sector for study area EDs

6.4.3 Land use

The map shown in **Figure 6.9** displays the Corine Land Cover (2018) within the boundary. This map gives a general idea of land uses in the study area. The main land cover types are Pastures, Transitional Woodland Scrub, Coniferous and Mixed Forests, Agriculture and Natural Vegetation, and smaller areas of Peat Bogs.

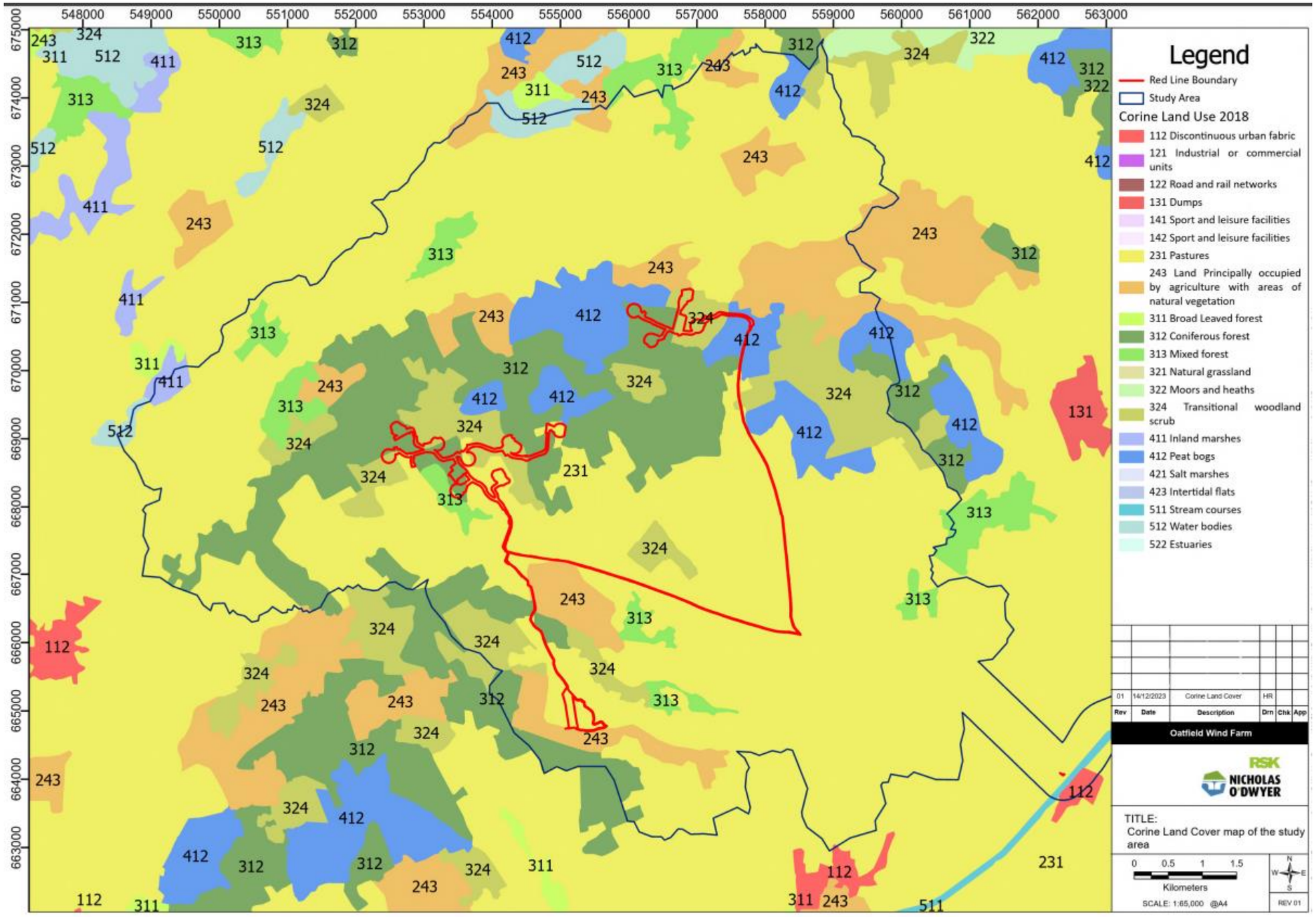

Figure 6.9: Corine Land Cover map of the study area

6.4.3.1 *Settlement pattern*

The settlement pattern of the area surrounding the Proposed Development site is evident in the sensitive receptors map displayed in **Figure 6.10** which shows the distribution of dwellings along local and regional roads in an 2 km radius of the proposed wind turbines in the WDA and EDA. There are dwellings located along the L3080 to the north of the WDA, as well as to the south along the R471. There is a cluster of dwellings in the settlement of Broadford (north of the EDA), as well as along the roads entering into Broadford from the south and west (R465 and L3080 respectively).

The GCR will be constructed primarily within the public road corridor and will entail several crossing points at road junctions, junctions with private lanes, and watercourses. Construction solutions proposed for these crossing points are described in EIAR **Chapter 5 Project Description**. The lands along the road corridor are mainly farmlands and private residential dwellings.

The TDR from the port of origin at Foynes is along national primary and secondary roads, until turning off to local roads to the site. The lands along the national road corridors are mainly farmlands, residential dwellings, commercial premises, and settlements including Clonlara and Killaloe, and the urban areas of Foynes and Limerick City. Accommodation works along the TDR are described in EIAR **Chapter 16 Traffic and Transport.** These works involve hedge or tree cutting, temporary relocation of powerlines/poles, lampposts, signage and local road widening. .

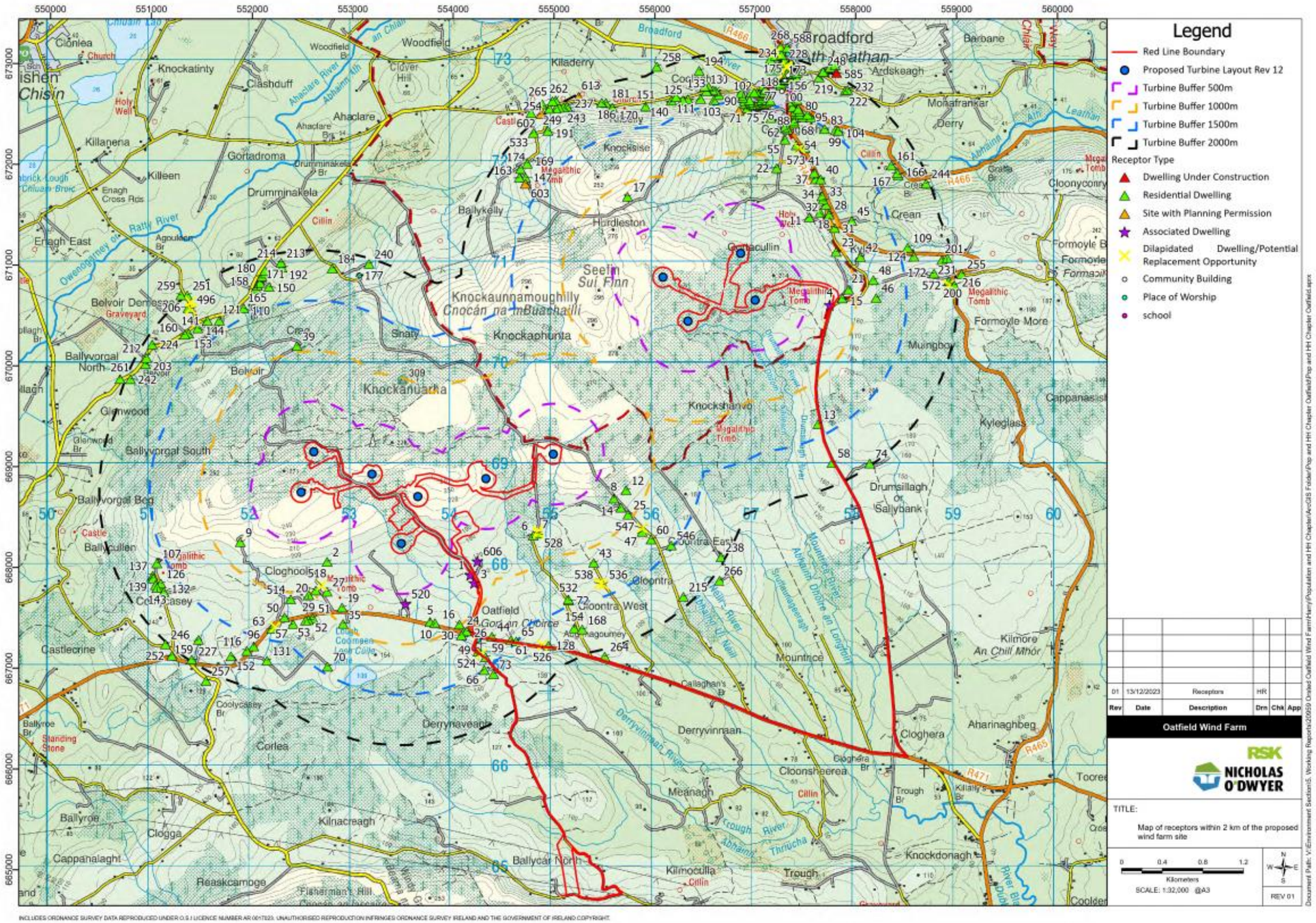

Figure 6.10 Map of receptors within 2 km of the Proposed Development

6.4.4 Recreation and tourism

The information found in this section of the chapter is taken mainly from Fáilte Ireland and the Clare County Development Plan 2023-2029. Notable recreation, amenity and tourism attractions and activities within 10km of the proposed wind farm site are listed in **Table 6.6** have been given a corresponding reference number in **Figure 6.11**, indicating their location. Major tourist and amenity attractions within 10km of the proposed wind farm site are in Limerick (King John's Castle, Bishop's Palace, and Thomond Park) and Clare (Bunratty Folk Park).

Table 6.6: Tourism and recreation amenities within 10km of the proposed wind farm site

Ref. No.	Name	Approx. Distance from proposed wind farm site (km)	General Direction
1	Woodfield House Hotel	9.6	South
2	Radisson Blu Hotel & Spa	8.1	South
3	Killaloe Luxury Pods	10.0	East
4	Clonlara Equestrian Centre	7.4	South-east
5	Cratloe GAA Club	8.5	South
6	Sixmilebridge GAA Club	5.0	South-west
7	O'Callaghans Mills GAA Club	4.8	North-west
8	Broadford GAA Club	1.5	North
9	Tulla GAA Club	10.0	North-west
10	Clonlara GAA Club	8.2	South-east
11	Parteen GAA Club	9.3	South-east
12	Abbey Sarsfield GAA Club	8.5	South
13	Limerick GAA Club	9.4	South
14	Na Piarsaigh GAA Club	9.4	South
15	Meelick GAA Club	6.1	South
16	Cappa GAA Club	5.3	South-west
17	Bishops' Palace Limerick Civic Trust	9.7	South
18	The Masonic Centre	9.6	South
19	Thomond Park	9.0	South
20	O'Brien Studio Bunratty Folk Park	10.0	South-west
21	Limerick Medieval Walking Trail	10.0	South
22	Saint Mary's Cathedral	9.9	South
23	Treaty City Brewery	9.8	South
24	Treaty Stone	9.7	South
25	King John's Castle	9.7	South
26	Funworld	9.3	South
27	Suas Climbing Centre	9.8	South-east

Ref. No.	Name	Approx. Distance from proposed wind farm site (km)	General Direction
28	River Shannon - Longshore, Plassey and the Cut Salmon Fishing	8.4	South
29	Rain Spa & Leisure Club	8.2	South
30	National Kart & Adventure Centre Limerick	9.7	South-east
31	The Sisters Social	8.6	South-east
32	Ballymorris Pottery	9.3	South-west
33	Traditional Irish Night at Bunratty Folk Park	10.0	South-west
34	Bunratty Castle & Folk Park	10.0	South-west
35	Cratloe Woods	8.0	South-west
36	Bunratty Winery	9.8	South-west
37	Forest Park Walk Cratloe	7.4	South-west
38	Castleconnell Fishery	6.3	South-east
39	Clonlara Equestrian Centre	7.5	South-east
40	O'Briensbridge - Errinagh Bridge Loop	8.9	South-east
41	O'Briensbridge - Old Barge Loop	8.9	South-east
42	O'Briensbridge - Parteen Weir Loop	9.1	South-east
43	12 O'Clock Hills	1.3	North-west
44	Knappogue Medieval Castle Banquet	8.4	West
45	Craggaunowen - The Living Past Experience	7.2	North-west
46	Clare Paintball	7.3	North-west
47	Doon Forest	3.1	North

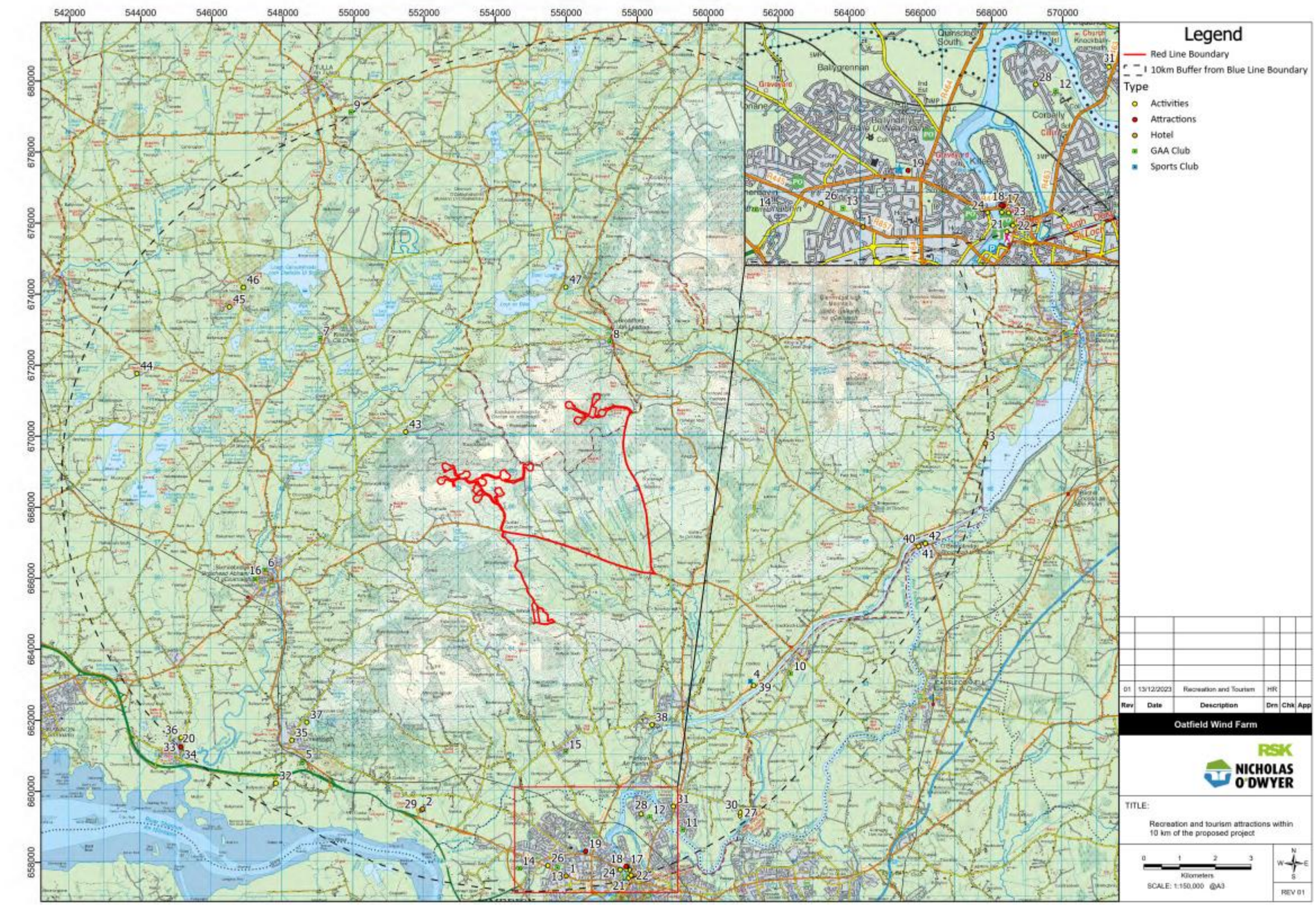

Figure 6.11 Recreation and tourism attractions within 10km of the Proposed Development

6.4.5 Human health

The Healthy Ireland Framework 2013-2025 defines health *as "everyone achieving his or her potential to enjoy complete physical, mental and social wellbeing. Healthy people contribute to the health and quality of the society in which they live, work and play"*. The Framework also states that health is much more than an absence of disease or disability, and that individual health, and the health of a country affects the quality of everyone's lived experience[3]

As shown in **Table 6.7,** 2022 CSO data records shows that in the study area the ED of Cloontra had the highest percentage of people that rated their health status as 'very good'. Of all the EDs in the study area, Cloontra also had the highest percentage of people who rated their health status as 'bad' and 'very bad'.

Table 6.7: Health status in the study area for 2022 in comparison to the County and State

Health Status – Percentage %						
Electoral Division	**Very good**	**Good**	**Fair**	**Bad**	**Very Bad**	**Not stated**
CASTLECRINE	62.6%	26.3%	7.9%	0.4%	0.0%	2.8%
CLOGHERA	65.5%	25.4%	6.8%	0.7%	0.0%	1.5%
CLOONTRA	72.3%	18.6%	4.9%	1.6%	0.3%	2.3%
KILSEILY	61.7%	29.4%	7.0%	0.7%	0.2%	1.0%
Study Area	65.5%	24.9%	6.7%	0.9%	0.1%	1.9%
County Clare	51.6%	25.4%	6.8%	0.7%	0.0%	1.5%
State	53.0%	30.1%	9.1%	1.4%	0.3%	6.1%

The percentage of people who considered themselves in 'Very good' health in the study area overall is higher than that for County Clare and the State. Overall, 90.9% of people in the study area rated their health as being 'good' and 'very good' in comparison to 77% for the County and 83.1% for the State.

6.4.6 Amenity

Through desktop studies and field surveys, sensitive receptors have been identified within a 2km radius of each of the proposed turbines in the Proposed Development for the assessments related to amenity effects on the population (i.e., shadow flicker, noise, and visual amenity). EIAR **Chapter 2 EIA Methodology** and associated appendices provide a description of the methodology employed in identifying the sensitive receptors for the assessments contained in the EIAR. The sensitive receptors identified include occupied dwellings, unoccupied dwellings (excluding dilapidated properties), planning

[3] Gov.ie, 'Healthy Ireland Framework 2013-2025' Available at: https://www.gov.ie/en/publication/e8f9b1-healthy-ireland-framework-2019-2025/

permission sites (validated and granted up to 4th December 2023), and places of worship, schools, and community buildings.

In total, 306 sensitive receptors are considered in the assessments for the EIAR.

- There are no sensitive receptors within 500m.
- There are thirty-six (36) sensitive receptors within 1km.
- There are ninety-eight (98) sensitive receptors within 1.5km
- There are three hundred and six (306) sensitive receptors within 2.1km

6.5 Potential effects - construction

This section (**Section 6.5**), **Section 6.6** and **Section 6.7** assess potential effects pre-mitigation throughout the construction, operational and decommissioning phases of the Proposed Development. **Section 6.8** presents proposed mitigation measures and residual effects following implementation of mitigation. **Table 6.8** presents a summary of effects.

6.5.1 Population

It is likely that many of the workers employed for construction of the Proposed Development will travel from outside the study area. Any direct and indirect jobs created or supported during the 18-month construction stage would be temporary in nature. This is not expected to result in changes to the population and demographic trends of the study area. There would be no effects on population and demographic trends during construction stage for the Proposed Development.

6.5.2 Employment

The Sustainable Energy Authority of Ireland (SEAI) report titled 'A Macroeconomic Analysis of Onshore Wind Deployment to 2020' (June 2015)[4] puts direct construction jobs from wind farm developments at 1.07 jobs per MW. On the other hand, the European Wind Energy Association (EWEA) report titled 'Wind at Work' (January 2009)[5] estimates that 1.2 jobs per MW are created during installation of wind energy projects. Using these multipliers, with an installed capacity in the range of 52.8MW – 72.6MW, the Proposed Development could create 71 to 79 direct jobs during its construction. It is likely that there will be additional direct employment for people living in the study area who may be qualified for construction related roles, and indirect employment opportunities for the many retail and service establishments in the nearby towns. Materials will be sourced in the general locality where possible. This will assist in sustaining employment in the local construction related trades and businesses for the 18-month construction stage of the Proposed Development. The construction stage of the proposed development will therefore likely have a short-term significant positive effect on the employment profile of

[4] SEAI, A Macroeconomic Analysis of Onshore Wind Deployment to 2020: An Analysis using the Sustainable Energy Economy Model, June 2015, https://www.seai.ie/publications/A-Macroeconomic-Analysis-of-Onshore-Wind-Deployment-to-2020.pdf, accessed 09/06/2023.

[5] EWEA, Wind at Work: Wind Energy and Job Creation in the EU, http://www.ewea.org/fileadmin/files/library/publications/reports/Wind_at_work.pdf, January 2009, accessed 21/06/2023.

the study area, and a short-term slight positive effect on local businesses and services in the nearby towns and villages in the study area during the construction stage.

6.5.3 Land use

During the approximately 18 – 24 month construction stage, forestry operations and farming activities of the involved landowners associated with the Proposed Development will be temporarily disrupted during site clearance and preparation including setting up temporary compounds, construction of access tracks, construction of the substation, and construction and installation of wind farm infrastructure. The construction works are confined to the lands within the red line boundary.

For the GCR, grid cabling will be installed in sections within the public road corridor. There will be rolling road closures in place to facilitate cabling works in combination with lane closures, partial road closures and stop/go systems. This will allow for the works to be completed efficiently and minimise disruption time for residents and businesses over the anticipated five-month duration of the works. This will likely result in brief slight negative effects to residential, agricultural, and commercial land uses where access will be temporarily restricted along the route.

Temporary accommodating works for the TDR options include temporary removal of street furniture, temporary surfacing at roundabouts, road verges and the site entrance, and trimming of trees and vegetation. There is a likelihood of effects on land use in proximity to the works. Land use activities along the TDR may be affected due to access restrictions which are likely during the transportation of turbine components over the public roads.

Based on the foregoing, the impacts on land use and activities at the works areas for the wind farm, GCR and TDR are likely to lead to brief to temporary slight to moderate negative effects on land use activities in the study area during the construction period.

6.5.4 Recreation and tourism

There is the potential for recreation and tourism amenities located in the study area to be impacted during the construction stage of the proposed development comprising works for the wind farm and for the GCR as well as the TDR. These would relate manly to landscape impacts arising from landscape change as a result of the Proposed Development, and traffic impacts related to movement of vehicles and construction machinery with potential to cause disruption during the proposed works.

Overall, the magnitude of landscape impacts within the site and its immediately surrounding context during construction stage is deemed to be High-medium and of a Negative quality, but of a Short-term duration.The significance of landscape effect is a function of landscape sensitivity weighed against the magnitude of construction stage landscape impact. Based on a Medium sensitivity judgement and a High-Medium magnitude of construction stage landscape impact, the significance of impact is considered to be Substantial-Moderate / Negative / short-term within and immediately around the site. Thereafter, significance will reduce to ‘Moderate’, ‘Slight’ and Imperceptible at increasing distances as the development becomes a progressively smaller component of the wider landscape fabric even in the context of higher sensitivity landscape units / features.

The effects to transport and access during construction on Pedestrian Severance, Delay, Amenity, Fear and Intimidation and Driver Delay would be temporary, slight and negative. For Accidents and Safety, the effects on transport and access during construction would be temporary, of moderate-significance, and negative.

The major tourism or amenity attractions within 10km of the Proposed Development (located in Limerick City and at Bunratty) would not be affected by the construction of the Proposed Development and therefore no impact on tourism numbers or revenue for these attractions is likely. The amenities and attractions more local to the site include GAA clubs and hiking areas. These may be impacted during construction stage by traffic to and from the works areas along the GCR as well as the TDR. .

In summary, effects arising from landscape change and traffic impacts on the recreation and tourism resources of the study area during the construction stage will be overall slight to moderate.

6.5.5 Human health

There is potential for negative effects on human health during construction of the Proposed Development. These include emissions to water of hydrocarbons and release of silt-laden runoff into watercourses which could potentially pollute private water supplies; and release of dust and exhaust emissions to air which could increase air pollution causing increased risk of stroke, heart disease, lung cancer, and both chronic and acute respiratory diseases.

The potential for release of pollutants to surface and groundwaters during construction at the works areas (Eastern and Western DAs and GCR) is addressed in EIAR **Chapter 9 Hydrology and Hydrogeology**. In the absence of mitigation, accidental release of suspended solids, hydrocarbons, horizontal directional drilling (HDD) fluid, wastewater sanitation contaminants, and cementitious material could pollute ground and surface waters which may be the source of water supplies, with potential for adverse effects on human health. The excavations on site will be relatively shallow and wet concrete will be used for turbine foundations and met mast and substation plinths, and associated footpaths. In the absence of mitigation, there is a potential to negatively impact groundwater quality when using poured concrete. All other concrete features for the Proposed Development will use precast concrete which will be imported on to site.

EIAR **Chapter 17 Air Quality** presents an assessment of the effects on air quality from construction of the proposed development including earthworks, construction and trackout activities[6]. The principal pollutants relevant to the assessment are considered to be NO_2, PM_{10} and $PM_{2.5}$,. These are regarded by the Institute of Air Quality Management (IAQM) as the three most significant air pollutants released by vehicular combustion processes or generated by vehicle emissions in the atmosphere through chemical reactions (IAQM, 2023). These pollutants, which arise from dust and exhaust emissions, are generally considered to have the greatest potential to result in human health impacts.

In the absence of mitigation, when assessed against the IAQM criteria, the magnitude of dust emissions for earthworks and construction of the Proposed Development is medium, whilst the magnitude of dust emissions from trackout along public roads and within the

[6] defined as the transport of dust and dirt from the construction/demolition sites onto the public road network, where it may be deposited and then re-suspended by vehicles using the network.

site is large. When combined with the sensitivity of the area in relation to human health, the risk of impacts on human health from dust are determined to be low (Refer to EIAR **Chapter 17 Air Quality**, Table 17.4).

In relation to exhaust emissions arising from traffic generation during construction, the predicted heavy goods vehicles (HGV) and light good vehicles (LGV) trip generation does not exceed the Design Manual for Roads and Bridges (DMRB) screening criteria and therefore further assessment of the construction stage traffic emissions is not required. The short-term increase in vehicle emissions during construction stage is therefore considered to be not significant. Operation of construction equipment and machinery on site will result in emissions to atmosphere of exhaust gases. With suitable controls and site management such emissions are considered short-term and not significant (as per Defra's Local Air Quality Management Technical Guidance, 2022).

Accommodating works along the public roads, along with the movement of vehicles for delivery of heavy/bulky goods and components on narrow roads, and works for the grid connection may lead to temporary limited access to farmlands and residential and commercial properties, creating a potential hazard along the route and at identified pinch points. In the absence of mitigation, this would have a temporary moderate, negative effect on public safety along the turbine delivery and grid connection routes during the construction stage.

6.5.6 Amenity

6.5.6.1 Noise

EIAR **Chapter 13 Noise and Vibration** describes the likely significant effects during construction of the Proposed Development. Most of the key construction activities would occur at relatively long distances from the relevant noise sensitive receptors such that the resulting predicted noise levels would not exceed 52 dB L_{Aeq}. Based on the guidance set out in BS 5228-1 summarised in Section 13.4of EIAR **Chapter 14**, this would likely result in negligible impacts.

For activities such as existing track upgrades, construction of a new site track, and off site works including road widening works for turbine component delivery or substation connection and most grid connection works along the existing road network, higher worst-case levels would occur but only for brief periods of time. Noise levels will quickly diminish as the works progress, moving the activity further from receptors. Due to the particularly short-term nature of the construction activity, the impact will be of minor magnitude at most on highly sensitive receptors, representing a short-term minor temporary adverse effect.

This would also be the case for Horizontal Directional Drilling (HDD) works likely to be required in two points along the GCR, except in cases where these works may need to continue outside of normal working hours once a bore has been started due to safety/operational reasons. Under these worst-case conditions, and in the absence of further mitigation measures, this would represent a major impact on some highly-sensitive receptors and therefore represents a short-term major temporary adverse effect.

In addition to on-site activities, construction-related traffic passing to and from the Proposed Development would also represent a potential source of noise to surrounding properties. The predicted increase in peak traffic noise calculated using the calculation of road traffic noise (CRTN) method is generally less than 1 dB(A), corresponding to a negligible impact. However, the worst-case increase would be for traffic site assessment point 5, where a predicted increase of 1.6 dB(A) in the day-time average noise level is predicted during particular phases of the construction programme. This would correspond to a minor impact based on DMRB guidance and therefore would represent a short-term minor temporary reversible adverse effect.

In conclusion, noise from most construction activities has been assessed and is predicted to result in a temporary negligible to minor adverse effects which are not significant. However, HDD drilling at night could represent a short-term major temporary reversible adverse effect, which is significant, in the absence of further mitigation.

6.5.6.2 Traffic

EIAR **Chapter 16 Traffic and Transport** describes and assesses the effects of construction of all elements of the Proposed Development which have the potential to give rise to negative effects on the existing road network. In respect of amenity, this would relate to pedestrian severance and driver delay.

The overall construction program is expected to last approximately 18-24 months. During this time, the site preparation and ground works, including the grid connection cabling works, will generate additional traffic on the local highway network. This will be negative, resulting in an increase in traffic levels of between +0.69% and 4.71% on the R471 regional road. The effect will be temporary, lasting the duration of this stage of the construction program (estimated at 13 months) with a moderate impact.

The predicted effects from the worst-case daily scenario traffic projections are based on the estimated construction programme, assuming that all deliveries are made via one route. In accordance with the IEMA Guidelines on Environmental Assessment for Road Traffic (July 2023), the assessment focuses on locations of the highway network where a potential increase in traffic of greater than 30% is identified. Projected changes in traffic flows of less than 10% create no discernible environmental effect .

The effects to transport and access during construction on Pedestrian Severance, Delay, Amenity, Fear and Intimidation and Driver Delay would be temporary, slight and negative, and therefore not significant. For Accidents and Safety, the effects on transport and access during construction would be temporary, of moderate-significance, and negative, and therefore not significant.

6.6 Potential effects - operation

6.6.1 Population

Any potential effects on population and demographic trends arising from the Proposed Development during its operation over its 35-year lifetime would relate to long term employment opportunities for skilled operations and maintenance personnel which can be drawn from the local area (refer to Section 6.6.2). Otherwise, these workers will come from further afield. The Proposed Development is not expected to result in changes to

population and demographic trends of the study area during the operation stage. The effects on population and demographic trends would therefore be imperceptible.

6.6.2 Employment

Once it is operational, the Proposed Development is likely to bring direct and indirect employment to the study area. As highlighted in a report by Siemens/IWEA titled "An Enterprising Wind",[7] in contrast to the short-term opportunities for employment during the construction stage, there is potential for longer term job creation (15 years) in the operations and maintenance of onshore wind farms. From a review of multiple sources on job creation potential of onshore wind, the SEAI report titled 'A Macroeconomic Analysis of Onshore Wind Deployment to 2020' (June 2015) estimates an average of 0.34 jobs per MW would be created to support operations and maintenance of wind farms. Based on this multiplier, the Proposed Development will have potential to create 22 jobs in the long term. This would have a long-term beneficial effect which has the potential to last beyond the operational life of the wind farm for the local community and region.

6.6.3 Land use

Once construction is completed, the footprint of the proposed development, taken as the area of land within the wind farm sites under permanent access tracks and turning areas, hardstanding areas and bases for the turbines and met mast, the substation and control buildings, and drainage infrastructure will total approximately 28.2 hectares (ha). This constitutes a permanent land use change from forestry and pasture to wind farm infrastructure. This will occupy a small portion (6-7%) of the total option land area (delineated by the blue line boundary) of 419 ha, resulting in a slight effect on land use.

All other infrastructure will be grassed over and will return to farming and forestry use in the operational stage. The hard-core base of the temporary internal access tracks, hardstanding areas and crane pads will remain under grass so that this infrastructure, which provides suitable turning radii and bases for movement of cranes and vehicles for replacement of turbine components, can be called into service in the unlikely event it is required over the operational lifetime of the wind farm.

It is envisaged that the land, outside the infrastructure in place for the lifetime of the wind farm, will continue to be used for farming and forestry operations throughout the 35-year operation lifetime of the wind farm and, as a result, there will be minimal impact on existing land uses for the operational stage.

The biodiversity enhancements proposed for the Proposed Development as contained in the Species and Habitat Management Plan (SHMP) (referenced in EIAR **Chapter 7 Biodiversity)** are the ecological features and management prescriptions which will enhance biodiversity within the site and improve sustainability of farming and forestry operations. This will result in major beneficial effects on land use in the site.

[7] Siemens/IWEA, 'An enterprising wind' – an economic analysis of the job creation potential of the wind sector in Ireland', 2013, http://www.tara.tcd.ie/bitstream/handle/2262/71272/BKMNEXT250.pdf?sequence=1&isAllowed=y, accessed 02/06/2023.

Though it is unlikely, there is potential for the grid connection to require repair and for accommodating works to be undertaken for transport of replacement turbine components during the 35-year operational life of the proposed Development. The effect of this activity and works, should they occur, will be the same as the construction stage with impacts on road users and occupiers of residential, commercial and other premises along the subject routes, arising from noise and disruption. However, these works will be brief, and therefore neutral to slight in effect.

In summary, adverse effects on land use arising from changes to land use (including land take) and activities in the site and study area during the operation are overall neutral-slight. These effects on land use are more than outweighed by the major beneficial effects on land use in the site from the biodiversity enhancements in the Proposed Development.

6.6.4 Recreation and tourism

The character and scenic qualities of the Irish landscape are of great importance to tourism in Ireland. In recognition of the need to achieve EU targets on reduction of greenhouse gas emissions and the potential conflict that may arise when identifying opportunity areas for developing renewable energy, SEAI and Fáilte Ireland have conducted surveys on visitor attitudes to wind farms in 2002, 2007 and 2012. The 2012 Fáilte Ireland publication titled 'Visitor Attitudes on the Environment, Wind Farms' (2012),[8] is an update on the often-cited Fáilte Ireland survey that was undertaken in 2007.[9] The following is summarised from the 2012 survey:

- 56% of visitors surveyed saw a wind farm while on holiday in Ireland, up from 49% in 2007.
- 47% of visitors surveyed felt that wind farms had a positive impact on the landscape, while 30 % felt it had a negative impact, compared with 32% and 17% respectively in 2007.
- 48% of visitors surveyed felt that wind farms had no impact on their sightseeing experience (up from 45% in 2007), with fewer saying they have a positive impact (down to 32% from 40% in 2007).
- 71% of visitors surveyed felt that greater numbers of turbines in Ireland would either have no impact or would have a positive impact on their likelihood to visit Ireland. The reason given for this is the positive support for renewable energy and recognition of the need to reduce carbon emissions.

In the report's conclusion, Fáilte Ireland states:

> *"Given the scenario where more wind farms are to be built in Ireland in the future, the most widely held view is that this will not impact their likelihood to visit the area again, with a slightly greater majority saying that this would have a positive rather*

[8] Fáilte Ireland, 'Visitor Attitudes on the Environment, Wind Farms', 2012 / No. 1 (Update on 2007 research), 2012, https://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/4_Visitor_Insights/WindFarm-VAS-(FINAL)-(2).pdf?ext=.pdf, accessed 22/06/2023.

[9] Fáilte Ireland, 'Visitor Attitudes on the Environment, Wind Farms', 2008 / No. 3, 2008, https://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/4_Visitor_Insights/Visitor-Attitudes-on-the-Environment.pdf?ext=.pdf, accessed 22/06/2023.

than a negative impact. It is worth noting that based on 2007 the proportion citing a positive impact has declined in favour of those who feel it would have no impact."

Wind Energy Ireland has conducted regular polls on public attitudes to wind farms since 2017. The latest survey commissioned by Wind Energy Ireland, was conducted by Interactions Research in November and December 2022. The results of the survey are reported in 'Wind Energy Ireland, Public Attitudes Monitor' (December 2022)[10] and were presented at the Wind Energy Ireland conference in February 2023. A summary of the results from the survey is as follows:

- Four out of five respondents (85% of those surveyed) are in favour of wind power. This is up 6% from 2021 surveys. Among a sample of rural dwellers, 85% registered favourable attitudes to wind power.
- The most cited reason for being in favour of wind power are that there is plenty of wind to be harnessed in Ireland. Other benefits mentioned were helping the environment, and the cost effectiveness / cost saving nature of wind power.
- 58% of respondents said they would be in favour of developing wind farms locally. This is the highest percentage since 2017. Among rural dwellers, 1 in 10 registered being opposed to developing wind farms locally.

In May 2023, SEAI published results of a survey of over 1,764 households, 1,116 of which are living within 5km of fifty new commercial wind and solar PV projects across rural Ireland.[11] The survey was undertaken in 2022 and is part of a long-term study to evaluate the effects of public policies on people's attitudes towards the energy transition in Ireland. A summary of the results from this survey are as follows:

- On average, 67% of those surveyed have registered a positive attitude to wind farms. The percentage is greater (72%) for those who live <1km from a wind farm.
- Across rural Ireland, general levels of support for wind and solar energy projects remain very high, regardless of whether people live close to new projects or far away.
- On average, 78% of those surveyed support government policies that secure financial benefits for households and communities through 'Community Benefit Funds'. This increases to 84% among those who live <1km to new renewable energy infrastructure projects.

Overall, these survey results demonstrate that there is increasing acceptance and more positive views of wind energy in Ireland by people living, working, and visiting areas where there are wind turbines. It is anticipated that, over time, the wind turbines in the Proposed Development will become a feature of the landscape and will be viewed positively by the community.

Once the Proposed Development is constructed, the wind turbines, access tracks and substation will become permanent features in the landscape. Inevitably, the effects of the

[10] Wind Energy Ireland, Public Attitudes Monitor (December 2022), https://windenergyireland.com/images/Final_WEI_Annual_Attitudes_Survey_2022.pdf, accessed 22/06/2023.

[11] SEAI, Irish national survey of households near new commercial wind and solar farms, Survey method and selected results, May 2023, https://www.seai.ie/community-energy/ress/impacts-research/index.xml, access 22/06/2023.

Proposed Development on recreation and tourism relate to the perceptions of those living, working, and visiting the study area, and their attitudes towards the presence of turbines in the wider landscape. Therefore, the operational effects of the Proposed Development on recreation and tourism relate to the findings from EIAR **Chapter 14 Landscape and Visual Impact Assessment**. These relate to landscape sensitivity weighed against the magnitude of physical landscape effects within the site and wider setting. The landscape impacts of the Proposed Development relate to the most susceptible physical landscape receptors within the study area. These are considered to be the lakelands which are throughout the northern extent of the central study area; the uplands in the northern extent of the wider study area; and Lough Derg and the River Shannon corridor in the eastern and southern extents of the study area. Whilst there is some sensitivity associated with the elevated lands in the surrounds of the site and in the southern aspect of the central study area, this landscape has a notable utilitarian character due to the extensive areas of conifer forestry, numerous major routes and telecommunication towers and radar equipment (Woodcock Hill).

Sensitive visual receptors within the central study area include users of the East Clare Way and areas that present with a strong sense of amenity, such as Doon Lough. The central and wider study area also encompasses numerous scenic view designations (identified in the current Clare, Tipperary and Limerick County Development Plans), whilst other sensitive heritage receptors within the wider study area include Bunratty Castle and King John's Castle, located in the southern half of the wider study area.

During the operational stage, the wind farm will be well assimilated within its landscape context without undue conflicts of scale with underlying land form and land use patterns. For these reasons, the magnitude of the landscape impact is adjudged to be **'**High-medium' with the immediate site context reducing to Medium within the Central Study Area. Beyond 5km from the site, the magnitude of landscape impact will reduce to Low and Negligible.

Based on a Medium sensitivity judgement and a High-Medium magnitude, the operational stage landscape impacts are considered to be significant (Substantial-Moderate / Negative / Long-term) within and immediately around the site. There, reducing to 'Moderate', 'Slight' and Imperceptible at increasing distances from the wind farm site.

When looking specifically at the impact on Tourism, Amenity and Heritage features, the landscape and visual impact assessment concluded that proposed development will not result in significant visual impacts in respect of tourism, heritage and amenity features within the study area.

6.6.5 Human health

An operational wind farm is not a recognised source of pollution. It is not an activity that falls within any thresholds requiring licensing under the Environmental Protection Agency Licensing Act 1992, as amended. As such, a wind farm is not considered to have ongoing significant emissions to the environment during its operation, and therefore no potential for negative human health effects.

In relation to safety aspects of human health, turbines pose no threat to the health and safety of to the public. Section 5.7 of the Department's 'Wind Energy Development Guidelines for Planning Authorities (2006) states

"*There are no specific safety considerations in relation to the operation of wind turbines. Fencing or other restrictions are not necessary for safety considerations. People or animals can safely walk up to the base of the turbines"* and further that *"There is a very remote possibility of injury to people from flying fragments of ice or from a damaged blade. Most blades are composite structures with no bolts or separate components and the danger is minimised as a result. The build up of ice on turbine blades is unlikely to present problems. Most wind turbines are fitted with anti-vibration sensors, which will detect any imbalance caused by the icing of the blades. The sensors will cause the turbine to wait until the blades have been de-iced prior to beginning operation."* (p. 31)

Turbine blades are manufactured of glass reinforced plastic which will prevent any likelihood of lightning strikes within the site of the proposed wind farm. Grounded lightning conduction cables will follow the electrical cable run from the nacelle to the base of the turbine. The conduction cables will be earthed adjacent to the turbine base. The earthing system will be installed during construction of the turbine foundations.

The provision of underground electric cables of the capacity proposed is common practice throughout the country and installation to the required specification does not give rise to any specific health concerns. The ESB document 'EMF & You' Information about Electric & Magnetic Fields and the electricity network in Ireland (2017)[12] provides practical information on EMF. Further details on the potential effects of electromagnetic interference on telecommunications and aviation are presented in EIAR **Chapter 11 Material Assets**.

6.6.6 Amenity

6.6.6.1 Shadow flicker

EIAR **Chapter 12 Shadow Flicker** presents an assessment of the 'worst case' shadow flicker which may result from operation of the proposed wind turbines. The results of modelling undertaken for the 306 sensitive receptors within the study area are based on study areas of 10 times rotor diameter for each of the candidate turbines of the Proposed Development as follows:

- Candidate turbine 1: 10x 150 m = 1,500 m study area
- Candidate turbine 2: 10x 149 m = 1,490 m study area
- Candidate turbine 3: 10x 133 m = 1,330 m study area

The modelling undertaken for the Proposed Development reveals for the 'worst-case' scenario the following results for each of the candidate turbines:

- Candidate turbine 1:

  Of the 101 receptors within the (1,500m) study area, 45 are predicted to experience no shadow flicker, while it is predicted that 56 may experience some shadow flicker.

[12] ESB, 'EMF & You' Information about Electric & Magnetic Fields and the electricity network in Ireland (2017), https://esb.ie/docs/default-source/default-document-library/emf-public-information_booklet_v9.pdf?sfvrsn=0, accessed 20/06/2023/

Of these, 40 may potentially exceed the Wind Energy Development Guidelines (2006) thresholds of 30 hours per year or 30 minutes per day.

- Candidate turbine 2:

  Of the 98 receptors within the (1,490m) study area, 43 are predicted to experience no shadow flicker, while it is predicted that 55 may experience some shadow flicker. Of these, 40 may potentially exceed the Wind Energy Development Guidelines (2006) thresholds of 30 hours per year or 30 minutes per day.

- Candidate turbine 3:

  Of the 69 receptors within the (1330m) study area, 26 are predicted to experience no shadow flicker, while it is predicted that 43 may experience some shadow flicker. Of these, 31 may potentially exceed the Wind Energy Development Guidelines (2006) thresholds of 30 hours per year or 30 minutes per day.

Without the application of mitigation entailing shutting down turbines when conditions are detected which could give rise to an exceedance of Wind Energy Development Guidelines (2006) thresholds, it is considered that there will be moderate significant amenity effects from operation of the wind farm arising from shadow flicker.

6.6.6.2 Noise

EIAR **Chapter 13 Noise and Vibration** reports on the assessment of operational effects of the Proposed Development on the amenity of nearest sensitive receptors which applies only to noise emissions from the wind turbines and substation.

Wind turbines

A worst-case noise assessment has been completed using the Candidate turbine model with the highest noise emission. Based on the modelling undertaken, predictions of operational noise for the Proposed Development in isolation at the noise-sensitive locations identified varied between 22 and 30 dB(A) at low wind speeds and 35 to 40 dB(A) at high wind speeds.

The detailed assessment undertaken demonstrated that these predicted noise levels comply with the noise limits for all properties and all locations. This assumed the use of a reduced noise operational mode ("SO2") for turbines 2 and 4 of the Proposed Development. For other turbine models, different operational restrictions (or none at all) may be required to achieve a similar conclusion. This means that the operational noise levels from the Proposed Development are considered acceptable in line with relevant guidelines. This represents a long-term permanent reversible adverse effect which is not significant.

Proposed substation

The main noise sources associated with the substation are likely to be the power transformers and their cooling fans. Given the separation distance of 580 m between the substation and the nearest non-involved residential properties, the associated noise levels at these properties will be of less than 30 dB L_{Aeq} due to separation distances involved. This would be clearly below the most stringent noise limit of 35 dB L_{Aeq} recommended in the NG4 guidance for classified installations, even accounting for the

potential character of the noise. Therefore, noise emissions are considered acceptable in line with relevant guidelines. This represents a long-term permanent reversible adverse effect which is not significant.

It is therefore concluded that there will be no amenity effects arising from noise during operation of the Proposed Development.

6.6.6.3 Landscape and Visual

EIAR **Chapter 14 Landscape and Visual Impact Assessment (LVIA)** presents an assessment of the visual amenity effects which will result from the introduction of turbines and related infrastructure in the landscape. With regard to visual receptors, the most sensitive visual receptors in this instance are considered to be the local community in the immediate vicinity of the development (within 5km of the site). It is concluded that the proposed turbines will present with a dominant visual presence from some of the nearest surrounding local community receptors and will be one of the defining built features along the elevated lands surrounding the site. However, the dispersed nature of the two distinct development areas limits the overall perceived scale of the development as the surrounding terrain and intervening vegetation reduce the potential for clear views of both parcels of the development areas to be viewed in combination from some parts of the central study area. Furthermore, the proposed turbines are located across a broad elevated ridge characterised by extensive areas of conifer forestry, which will help to assimilate the overall scale of the turbines into this landscape context. For the foregoing reasons, it is not considered that the Proposed Development will give rise to significant visual impacts on local community receptors during the operation stage.

6.7 Potential effects - decommissioning

The decommissioning stage of the Proposed Development is described in Section 5.5.of EIAR **Chapter 5 Project Description.** In the decommissioning stage, cranes will be used to disassemble each turbine section for their removal from the site. The upper sections of the foundations projecting above ground will be removed, and the remainder of the foundations will be covered by soils typical of the surrounding environment, then reseeded or left to re-vegetate. Underground cables will be cut back at the turbine termination points and will be recycled. Site access tracks will remain to allow access through the site for farm operations. Decommissioning the proposed development will take approximately 2 months to complete.

The potential effects of decommissioning are the same as those associated with the construction stage, however reduced in magnitude.

6.7.1 Population

The potential effects associated with the decommissioning stage in relation to population and demographic trends will be the same as for the construction stage. The effects are likely to be imperceptible.

6.7.2 Employment

The potential effects associated with the decommissioning stage in relation to employment would be significantly reduced in magnitude to the effects predicted during

construction. No construction works are required, and the specialist personnel who would disassemble the turbines are likely to come from outside the study area. There would be a limited number of direct and indirect jobs generated from decommissioning activity, with only a short-term slight positive effect on the employment profile of the study area, and a short-term slight positive effect on local businesses and services in the nearby towns and villages in the study area.

6.7.3 Land use

The proposed turbines will have a design lifetime of approximately 35 years. The operator may wish to replace turbines prior to the end of the design lifetime and continue use of the site to produce renewable electricity. Such a decision would be made following an assessment by the operator and turbine supplier, and only on approval from the appropriate planning authority. If a decision is taken to discontinue use of the site to produce renewable electricity, the turbines and tops of foundations will be removed from the site, as described, and the lands will revert fully to agricultural use. The decommissioning works is likely to have a brief slight negative effect on land-use in the wind farm site and study area.

6.7.4 Recreation and tourism

The decommissioning works will not interact with nearby recreational facilities and tourism. It is expected that the decommissioning stage of the Proposed Development will have an imperceptible effect on recreation amenities and tourism.

6.7.5 Human health

There is potential for negative effects on the health and safety of workers and the public during decommissioning associated with the presence of a construction crew at the wind farm sites, increased traffic entering and leaving the sites, the presence of heavy goods vehicles and machinery on the public roads, and potential obstructions and delays to road users. The potential effects on public health and safety during the decommissioning stage is considered temporary moderate and negative.

6.7.6 Amenity

As with the construction stage, the impacts on amenity arising from decommissioning works relate to noise and traffic, but the effects will be greatly reduced. It is expected that the decommissioning stage of the Proposed Development will have a slight to imperceptible effect on amenity as a result.

6.8 Mitigation measures and residual effects

6.8.1 Population

The effects on population and demographic trends during construction, operation and decommissioning are imperceptible, therefore no mitigation measures are required, and there are no residual effects.

6.8.2 Employment

As the direct and indirect effects of the Proposed Development during construction, operation and decommissioning on employment and the economy are positive and beneficial, no mitigation measures are required, and there are no residual effects.

6.8.3 Land use

Effects on land use arising during construction, operation and decommissioning are not significant. No mitigation measures are required, and there are no residual effects.

6.8.4 Recreation and tourism

Effects on recreation and tourism during construction and operation would relate to landscape change which is mitigated by design, and traffic impacts to the local area. In relation to traffic impacts on recreation and tourism, once the mitigation measures outlined in the Construction Traffic Management Plan (CTMP) (referenced in EIAR **Chapter 5 Project Description**) are implemented there would be no residual effects on recreation and tourism.

6.8.5 Human health

As described in EIAR **Chapter 9 Hydrology and Hydrogeology**, to protect groundwater quality, the pouring of concrete within the works areas will be prepared and controlled, including shuttering and the use of geotextile membrane to minimise escape of material. Once it is set, concrete is effectively inert. The mitigation measures contained in EIAR **Chapter 9** are incorporated in a Construction Environmental Management Plan (CEMP) (referenced in EIAR **Chapter 5 Project Description**). Buffers from drainage channels are observed in the design of the wind farm. These, along with best practice environmental management measures prescribed in the Surface Water Management Plan and the CEMP (will prevent pollution and protect surface and groundwater quality, and thereby human health. Once mitigated, the release of pollutants (i.e., cementitious material, hydrocarbons, HDD fluid, etc.) during construction with potential for impacting ground and surface water quality will be minimal and temporary, if it occurs at all. The residual effects are expected to be temporary, adverse and neutral.

Chapter 16 Traffic and Transport concludes that following mitigation, negative effects on the receiving environment associated with the construction works on the WDA and EDA and the GCR will be short-term in duration and slight in significance, whilst the works associated with the TDR will be temporary in duration and slight following mitigation. Traffic management measures will be put in place as detailed in EIAR **Chapter 16** and in the CTMP (referenced in EIAR **Chapter 5**. This will result in limited disruption to land use along the GCR for an anticipated duration of 5 months. Once good practice is followed, the potential for negative impact on public health and safety, the residual effects are expected to be temporary and not significant.

In relation to EIAR **Chapter 1 Air Quality**, all construction effects were assessed to be not significant provided that the recommended dust control and exhaust mitigation measures for construction, and to a lesser extent decommissioning stage, as set out in **Chapter 17**, Section 17.6 are applied. Residual effects are therefore not significant.

In relation to **Climate** (EIAR **Chapter 18)**, following the implementation of mitigation measures, due to the emission of GHGs during the construction (and decommissioning activities) the Proposed Development is likely to result in a direct, long-term minor adverse effect on global climate (with emissions remaining in the atmosphere for a long period of time (years, decades and beyond). However, this minor adverse effect is largely outweighed by the direct, long-term significant beneficial effect of operation of the wind farm upon the global climate, such that the overall net effect of the Proposed Development, after implementation of mitigation measures, is likely to be a significant beneficial effect. This is because the net GHG effects of the Proposed Development will be below zero therefore resulting in a reduction in atmospheric GHG concentration. This reduction will be brought about by the displacement of fossil fuel energy sources by the renewable energy produced by the development. This will contribute to overall positive effects on human health and wellbeing of the population.

A decommissioning plan for the proposed works will be prepared and followed, clear signage will be utilised on public roads and, as with construction, the community will be informed of works prior to commencement to avoid any potential negative impact to human health and public safety.

6.8.6 Amenity

The potential for shadow flicker is only possible during operation of the turbines. Through the implementation of a shadow flicker control system to curtail the operation of the turbines during periods where shadow flicker could occur, impacts from shadow flicker from the turbines can be mitigated, except for a short period once the pause criterion is met and for the turbine(s) to come to a stop. It is therefore considered that the residual shadow flicker effects on all sensitive receptors (including those outside the study area) would be short in duration and negligible, resulting in no significant adverse residual effects. The residual effect on amenity arising from operation of the turbines is therefore imperceptible.

In relation to noise during construction, recommended mitigation measures include community notification and best practicable means in the selection and use of equipment, work practices, and noise reduction measures at construction works sites. Following the application of mitigation as set out in EIAR **Chapter 13**, Section 13.9, it is concluded that the residual noise and vibration effects from construction at the wind farm site are temporary slight negative, whilst along the grid connection route the noise and vibration effects from the proposed works are considered brief, significant, and negative.

During the operational stage, noise mitigation measures will be implemented to ensure that turbine noise levels will comply with the criteria at House 17, The mitigation measure proposed is to operate Turbines T6, T8 and T9 in a reduced mode at 6m/s (v_{10}) wind speed, during daytime periods (07:00 to 23:00hrs), when wind directions are 220 to 340 degrees from north (i.e., broadly westerly winds). Following application of the proposed noise mitigation measure during the operational stage, the calculated turbine noise levels will comply with the noise criteria at all properties. There will be no residual effects.

6.9 Summary

Table 6.8 (overleaf) provides a summary of the assessment of effects of the Proposed Development on population and human health.

Table 6.8: Summary of Assessment of Effects – Population and Human Health

Potential Effect	Beneficial / Adverse / Neutral	Extent (Site / Local / National / Transboundary)	Short term/ Long term	Direct / Indirect	Permanent / Temporary	Reversible / Irreversible	Significance of Effects (according to defined criteria)	Proposed Mitigation	Residual Effects (according to defined criteria)
Construction Phase									
Population	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Employment	Beneficial	Local	Short term	Direct and Indirect	**Temporary**	**Reversible**	**Slight**	**N/A**	**N/A**
Land Use	Adverse	Local	Short term	Direct	**Temporary**	**Reversible**	**Slight to Moderate**	**N/A**	**N/A**
Recreation and Tourism	Adverse	Local	Short term	Direct	**Temporary**	**Reversible**	**Slight to Moderate**	**CTMP**	**Slight**
Human Health	Adverse	Local	Short term	Direct	**Temporary**	**Reversible**	**Slight to Moderate**	**CEMP, CTMP**	**Slight**
Amenity	Adverse	Local	Short term	Direct and Indirect	**Temporary**	**Reversible**	**Slight to Major**	**CEMP, CTMP**	**Minor**
Operational Phase									
Population	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Employment	Beneficial	Local	Long term	Direct and Indirect	**Temporary**	**Reversible**	**Moderate**	N/A	N/A
Land Use	Beneficial	Local	Long term	Direct and Indirect	**Temporary**	**Reversible**	**Moderate**	N/A	N/A
Recreation and Tourism	Adverse	Local	Long term	Indirect	**Temporary**	**Reversible**	**Moderate**	N/A	N/A
Human Health	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Amenity	Adverse	Local	Short term	Direct	**Temporary**	**Reversible**	**Moderate**	**Shadow flicker detection and controls on turbine operation**	**Slight**
Decommissioning Phase									
Population	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Employment	Beneficial	Local	Short term	Direct and Indirect	**Temporary**	**Reversible**	**Slight**	N/A	N/A
Land Use	Adverse	Local	Short term	Direct	**Temporary**	**Reversible**	**Slight**	N/A	N/A
Recreation and Tourism	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Human Health	Adverse	Local	Short term	Direct	**Temporary**	**Reversible**	**Slight**	N/A	N/A
Amenity	Adverse	Local	Short term	Direct and Indirect	**Temporary**	**Reversible**	**Imperceptible to Slight**	N/A	N/A

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- EPA spatial data (including Corine Land Cover mapping), available at: https://gis.epa.ie/GetData/Download
- Fáilte Ireland records and spatial data, available at: https://www.failteireland.ie/Research-Insights/Open-data.aspx

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