

ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED BALLINAGREE WIND FARM

VOLUME 2 - MAIN EIAR

CHAPTER 11 – POPULATION, HUMAN HEALTH & MATERIAL ASSETS

Prepared for: Ballinagree Wind DAC



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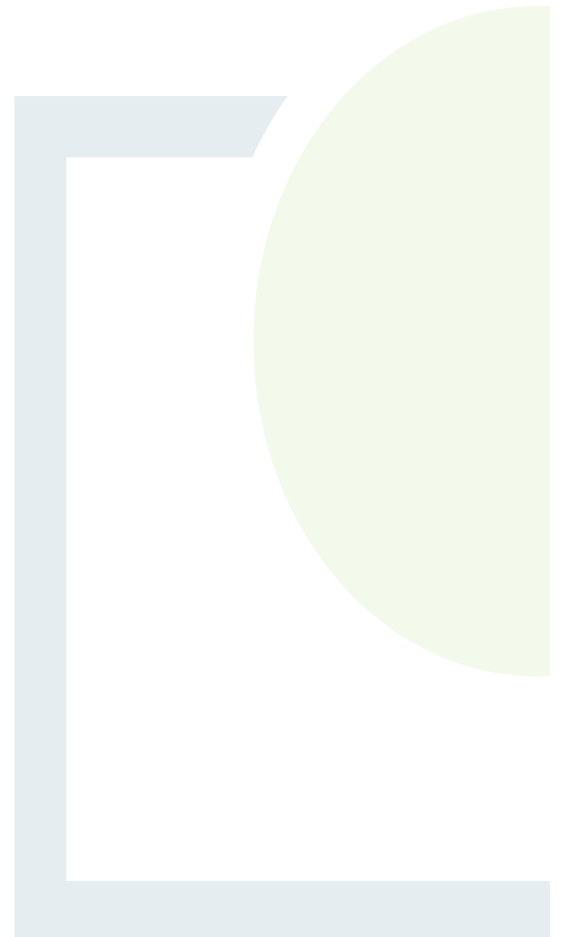


TABLE OF CONTENTS

11 POPULATION, HUMAN HEALTH & MATERIAL ASSETS.....	1
11.1 Introduction.....	1
11.2 Methodology	2
11.3 Population	7
11.3.1 Existing Environment - Population	7
11.3.2 Potential Impacts on Population - Construction	12
11.3.3 Potential Impacts on Population - Operational.....	13
11.3.4 Potential Impacts on Population - Decommissioning	13
11.3.5 Mitigation Measures - Population.....	13
11.3.6 Residual Impacts - Population.....	14
11.4 Socio-economics, Employment and Economic Activity.....	14
11.4.1 Existing Environment – Socio-economic, Employment and Economic Activity	14
11.4.2 Potential Impacts – Socio-economics, Employment and Economic Activity - Construction ...	16
11.4.3 Potential Impacts – Socio-economics, Employment and Economic Activity - Operational	17
11.4.4 Potential Impacts – Socio-economics, Employment and Economic Activity - Decommissioning	21
11.4.5 Mitigation Measures – Socio-economics, Employment and Economic Activity	21
11.4.6 Residual Impacts – Socio-economics, Employment and Economic Activity	21
11.5 Land Use	22
11.5.1 Existing Environment – Land Use	22
11.5.2 Potential Impacts – Land Use - Construction	25
11.5.3 Potential Impacts – Land Use - Operation	26
11.5.4 Potential Impacts – Land Use – Decommissioning	27
11.5.5 Mitigation Measures – Land Use.....	28
11.5.6 Residual Impacts – Land Use	29
11.6 Recreation, Amenity and Tourism.....	29
11.6.1 Existing Environment – Recreation, Amenity and Tourism.....	29
11.6.2 Potential Impacts – Recreation, Amenity and Tourism - Construction.....	32
11.6.3 Potential Impacts – Recreation, Amenity and Tourism - Operation	33
11.6.4 Potential Impacts – Recreation, Amenity and Tourism - Decommissioning.....	38
11.6.5 Mitigation Measures – Recreation, Amenity and Tourism	38
11.6.6 Residual Impacts – Recreation, Amenity and Tourism.....	38
11.7 Human Health & Safety	39

11.7.1	Existing Environment – Human Health & Safety.....	39
11.7.2	Potential Impacts – Human Health & Safety - Construction.....	40
11.7.3	Potential Impacts – Human Health - Operation.....	43
11.7.4	Potential Impacts – Human Health – Decommissioning.....	51
11.7.5	Mitigation Measures – Human Health & Safety	52
11.7.6	Residual Impacts – Human Health	54
11.8	Renewable, Non-Renewable Resources and Utility Infrastructure.....	55
11.8.1	Existing Environment – Renewable, Non-Renewable Resources and Utility Infrastructure....	55
11.8.2	Potential Impacts – Renewable, Non-Renewable Resources and Utility Infrastructure - Construction	56
11.8.3	Potential Impacts – Renewable, Non-Renewable Resources and Utility Infrastructure - Operational	59
11.8.4	Potential Impacts – Renewable, Non-Renewable Resources and Utility Infrastructure – Decommissioning	59
11.8.5	Mitigation Measures – Renewable, Non-Renewable Resources and Utility Infrastructure	60
11.8.6	Residual Impacts – Renewable, Non-Renewable Resources and Utility Infrastructure	60
11.9	Do-Nothing Scenario	61
11.10	Cumulative Impacts.....	61
11.11	Conclusion	63
11.12	References	66

LIST OF FIGURES

	<u>Page</u>
Figure 11-1: Site Location Map.....	6
Figure 11-2: Receptors within the vicinity of the Proposed Development	10
Figure 11-3: Population Density of the Project Area (2016)	11
Figure 11-4: Corine Land Cover Map	24
Figure 11-5: Recreational Amenity Trails	37

LIST OF TABLES

Table 11-1: Electoral Divisions Associated with the Study Area	7
Table 11-2: Population Statistics 2006-2016.....	8
Table 11-3: Population Density between 2006 – 2016	9
Table 11-4: Live Register Data for Cork County and the State March 2018 – March 2021	14
Table 11-5: Economic Status of the Total Population Ages 15+ in 2016.....	15
Table 11-6: Industry Distribution by Area	16
Table 11-7: South West Regional Performance (Tourists in 2018)	30
Table 11-8: South West Regional Performance (Tourists in 2019)	30
Table 11-9: Population by General Health (Census, 2016)	39
Table 11-10: ICNIRP Guidelines	46



11 POPULATION, HUMAN HEALTH & MATERIAL ASSETS

11.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) examines the potential effects of the proposed Ballinagree Wind Farm on Population, Human Health and Material Assets. The chapter includes a description of the existing environment in respect of population, human health and material assets and considers the likely effects arising from the proposed project during construction, operation and decommissioning under the following elements:

- Population;
- Employment and Economic Activity;
- Land Use;
- Recreation, Amenity and Tourism;
- Human Health and potential for the project to cause accidents and/or natural disasters and the vulnerability of the project to potential disaster/accidents; and
- Renewable Resources, Non-renewable Resources and Utility Infrastructure.

There are a wide range of sources of effects from the project with potential to impact on the elements listed above, which focus on human interaction with the proposed project. The assessment presented in this chapter draws upon the findings of other chapters throughout the EIAR, including air quality, noise, shadow flicker, traffic & transport, landscape and visual impacts and telecommunications & aviation are addressed separately in Chapters 6, 7, 12, 13, 15 and 16 of Volume 2 of this EIAR respectively. Potential impacts associated with lands, soils and geology are discussed in Chapter 9 and potential affects associated with hydrology and water quality are discussed in Chapter 10 of this EIAR. In addition, other assessments are set out including those relating to potential effects on population statistics, socio-economics, changes to land use, facilities, human perception, human safety and potential impacts to resources.

Material assets relating to transport infrastructure are dealt with in Chapter 13: Traffic and Transportation. Material assets with respect to natural resources are considered in Chapter 9: Lands, Soil and Geology, Chapter 10 Hydrology and Water Quality, Chapter: 6 Air Quality and Climate, and Chapter 8: Biodiversity. Assets of Archaeological, Architectural, and Cultural Heritage are considered in Chapter 14 of Volume 2 of this EIAR. The findings of these chapters in terms of the potential and residual impacts on population and human health are drawn upon in this chapter.

Throughout this chapter the ‘proposed development’ refers to the elements of the project for which consent is being sought as set out in Chapter 3. This comprises the wind farm site including turbines, hardstandings, met mast, substation, access tracks, associated infrastructure, grid connection and works involving the Turbine Delivery Route (TDR). The ‘project’ refers to all elements including the proposed development and Biodiversity Enhancement Lands.

For assessment purposes the proposed project is separated into four distinct elements.

- The wind farm site (also referred to in this EIAR as ‘the Site’);
- The grid connection;
- The turbine delivery route (also referred to in this EIAR as ‘the TDR’);



- For this assessment the Biodiversity enhancement and management plan lands (also referred to in this EIAR as ‘the BEMP lands’) will be scoped out for population assessment as no impact on population, human health and are expected.

These four areas combined make up the ‘Study Area’.

This assessment considers the range of turbines selected for this project as described in Chapter 1 Introduction and Chapter 3 Development Description.

11.2 Methodology

This chapter of the EIAR which assesses potential effects on population, human health and material assets has been prepared following a review of the National Planning Framework, The Regional Spatial and Economic Strategy for the Southern Region, and the Cork County Development Plan 2014.

This chapter of the EIAR has been completed in accordance with the guidance set out by the Environmental Protection Agency (EPA), in particular, the Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports’ (EPA, August 2017), The Government of Ireland’s Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August, 2018) and the European Union’s guidance document: Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report as per Directive 2011/92/EU as amended by 2014/52/EU. The determination of significance of impact is in line with the EPA’s Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports’ (EPA, August 2017).

Population

Demographic data has been sourced from the Central Statistics Office (CSO)’s Census of Ireland (2006 to 2016) records. Demographic information relating to the State, County Cork, and the ‘Study Area’ has been assessed to establish the existing demographic trends. The demographic analysis of the study area as set out in this Chapter is defined in terms of Electoral Divisions (EDs), within which the wind farm site boundary is contained and within which the grid connection works and TDR are contained. Therefore, for the purpose of this aspect of the assessment, there are three separate areas contained within the ‘Study Area’ as follows:

- The wind farm site and the BEMP lands are within the EDs of Kilberrihert, Rahalisk, Mountrivers, Crinnaloo and Nad.
- The grid connection element of the project is located in the EDs of Kilberrihert and Rahalisk.
- The turbine delivery route (‘TDR’) is contained with the EDs of Kilberrihert, Kilcorney, Drishane, Rathcool, Keale and Rosnalee before the TDR meets a national primary route at the N72, north east of Millstreet.

The Study Area including the Main Wind Farm Site, BEMP lands, Grid Connection and TDR are identified in Figure 11-1. For the purposes of the assessment of potential effects on population trends, the TDR area covers electoral divisions where significant works are proposed. Areas of the TDR located along national primary routes have been screened out as effects are likely to be imperceptible due to the limited nature of the proposed works along these routes and the capacity of the routes to accommodate large vehicles and loads associated with the delivery of turbine components to the main wind farm site.



Eircode data (2020), Geodirectory data, and planning application lists sourced from Cork County Council, An Bord Pleanála and the Department of Housing and Local Government's EIA Portal have been assessed to identify any commercial or residential receptors in proximity to the proposed development. These sources were assessed in April 2021. Eircode and Geodirectory data provides locations (geographic coordinates) for registered addresses. This information was ground-proofed with a house survey where a surveyor travelled the Main Wind Farm Site and identified locations of all residential receptors in proximity to the proposed wind farm. A desktop house survey was carried out for the Grid Connection and TDR where temporary works are proposed. A planning search was conducted to identify permitted unbuilt dwellings and planned dwellings which do not appear on Eircode or Geodirectory Databases and are not visible from ground proofing exercises.

The data gathered has informed the consideration of impacts on the existing population within the immediate environs of the proposed development and allows for a comprehensive assessment of the potential effects on population trends which may occur during the construction, operational, and decommissioning phase of the proposed development.

Socio-Economics

A socio-economic profile of the existing environment was established using live register data (2018 to 2021) and Census (2016) data to outline an employment profile of the study area. Peer reviewed research from the Institute for Sustainable Futures and the European Wind Energy Association was referred to in order to estimate the employment which the proposed development has the potential to create through the construction, operation and decommissioning phases of the proposed development, and the impact this employment will have on the study area.

Land Use

Land use in the area was examined to determine potential impacts on existing land use patterns which may arise as a result of the proposed development. Corine Land Cover data (2018) was studied and observation was carried out throughout the ground-proofing survey to determine land uses in the study area. The impact of the proposed development was then considered with regard to these land uses. As detailed in Chapter 5, the Felling Section of the Department of Agriculture, Food and the Marine have requested that potential impact to land use, i.e. the conversion of forestry to another type of land use, should be considered in the EIAR.

Recreation, Amenity & Tourism

With regard to Recreation, Amenity and Tourism, Fáilte Ireland published a guideline document on tourism and environmental impacts in 2011 entitled 'Guidelines on the Treatment of Tourism in an Environmental Impact Statement'. This document has been considered and is referred to in Section 11.6 of this Chapter. The document informed the methodology used in assessing potential impacts on Recreation, Amenity and Tourism. A profile of tourism in the region was established through examination of Fáilte Ireland Statistics in order to indicate the strength of Recreation, Amenity and Tourism in the surrounding region. Recreation and amenity facilities and attractions in the area were identified through a desktop study and distances from the proposed development were established. Potential impacts as a result of the proposed development were then considered in relation to the tourism profile, amenity and recreation facilities and attractions of the area.



Human, Health & Safety

The assessment on human health and safety has regard to the Environmental Protection Agency's (EPA US) Human Health Risk Assessment process which provides information on potential human health impact. CSO data (2016) and reports published by the Department of Health were examined to establish a baseline health profile of the study area. Criteria of potential impacts on human health was extracted from this literature in order to assess potential effects on human health as a result of the proposed development. A desktop examination of potential hazardous land uses in the study area was carried out and vulnerability of the project to natural disaster was assessed through a desktop geographical study and literature review. The assessment was further informed by field surveys and slope stability assessment which were completed as part of the EIA process. Potential impacts to human health as described throughout this EIAR are detailed in this Chapter, including potential impacts on air quality, noise and traffic and potential impacts on human safety including potential for flood risk and slope failure.

Renewable Resources, Non-renewable Resources and Utility Infrastructure

An examination of material assets was carried out which includes renewable and non-renewable resources and utility infrastructure. A desktop study established material assets of the area such as quarries and peat bogs, in line with Geological Survey Ireland's scoping response as detailed in Chapter 5. Infrastructure and various telecommunications companies were contacted during the scoping process to identify infrastructure in the area. Potential impacts on the identified material assets as a result of the proposed development were then examined.

As outlined in Chapter 5: EIA Scoping, Consultation, and Key Issues, prior to preparing the EIAR, statutory authorities and other relevant bodies were consulted. Key items of relevance to Population, Human Health and Material Assets, as raised by these parties have been addressed and referenced within this Chapter of the EIAR where relevant.

Consultation responses of relevance to the population, human health and material assets assessment were received from the Department of Agriculture, Food and the Marine, Irish Water and Geological Survey Ireland as well as from the wider community through public consultation. The consultation responses received have been given due consideration in the formation of this chapter.

Cumulative Effects

In relation to cumulative effects for Population, Human Health, and Material Assets, the potential effect of the proposed project 'in combination' with other projects, constructed, proposed or permitted has been assessed. The cumulative impact assessment provides a baseline from which a full environmental assessment of the potential effects arising from the project in combination with other plans and projects can be considered comprehensively. A search for proposed, consented and existing projects was conducted within 20km of the proposed project to identify development in proximity to the Wind Farm Site, BEMP lands, GCR and TDR.

A 20km distance was considered a reasonable zone of influence for the purpose of assessing potential cumulative effects on population, human health and material assets, considering the size and extent of the project, the nature of the impacts and the receiving environment of the wider area. The geographic extent of the cumulative assessment is considered on a case-by-case basis, in line with the Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (European Commission, 1999).



The 20km radius from the proposed turbines is considered relevant in line with the recommended study area for the zone of theoretical visibility of proposed wind farm projects as set out in the Wind Energy Development Guidelines (2006) which cites the use of a 20 km radius for blade tips greater than 100m. This represents a visual study area for potential cumulative projects but also represents an appropriate study area for other potential cumulative effects including traffic, noise, water quality and air quality. It is considered that potential impacts beyond this distance are imperceptible.

Other less significant projects were also examined in close proximity to the Wind Farm Site, BEMP Lands, TDR and GCR where construction and operation of proposed, consented or existing projects may be affected by the construction activities of the proposed Ballinagree Wind Farm project. All development within 250m of the TDR nodes and the GCR were examined for potential cumulative effects. It is considered that potential impacts posed by small scale projects beyond this distance will be imperceptible.

Monthly planning searches from May 2020 to November 2021 were carried out to identify proposed development in proximity to the Main Wind Farm Site, BEMP Lands, Grid Connection and TDR. This included a search for major infrastructure projects in the zone of influence; large residential, renewable energy or commercial developments in the zone of influence; proposed or consented development within the immediate environs of the proposed project; as well as an examination of relevant plans and policies for the area as detailed in Chapter 4: Policy. Cumulative impact is further detailed in Section 11.10.

Mitigation Measures

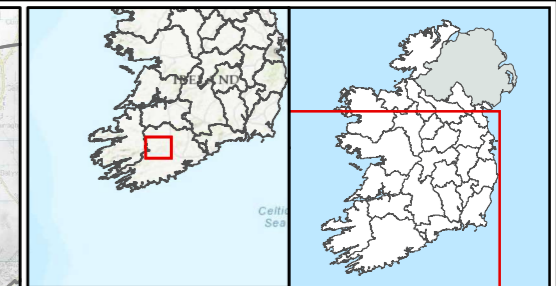
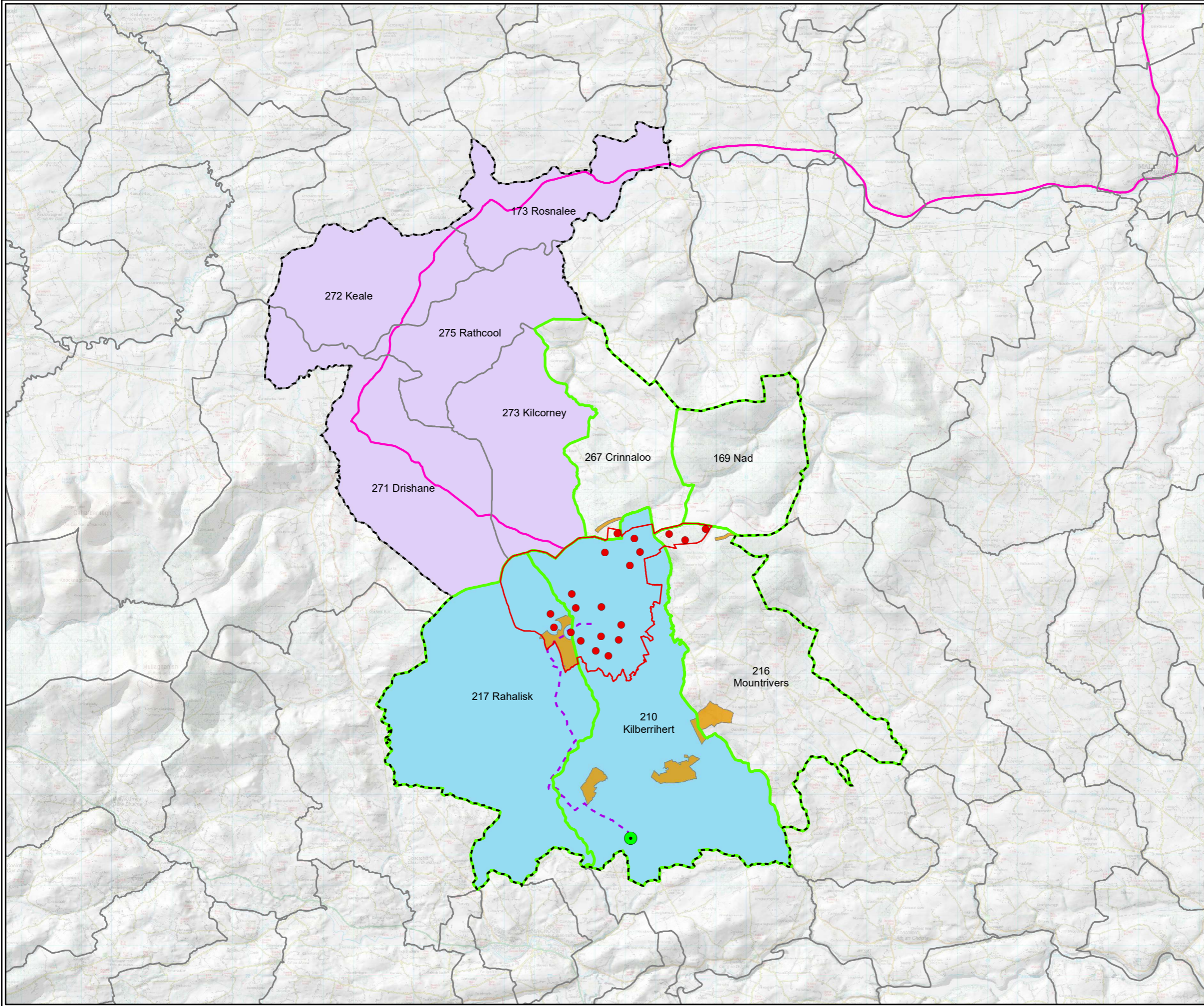
Where potential significant effects has been identified, mitigation measures have been proposed. Residual impact is then considered which details potential impacts following implementation of mitigation measures.

Do-nothing Scenario

A do-nothing scenario is outlined, in line with requirements of the EIA Directive 2014 which states: “The environmental impact assessment report to be provided by the developer for a project should include a description of an outline of the likely evolution of the current state of the environment without implementation of the project”. This section details the receiving environment as it would be in the future should the proposed project not be carried out.

References

Finally, all materiel which contributed to the establishment of the baseline conditions and assessment of potential impacts are referenced in Section 11.2.



Legend

- Proposed Turbine Layout
- Clashavoon Substation
- Turbine Delivery Route
- - - Grid Connection
- Proposed Wind Farm Site
- Main Wind Farm Site
- Study Area
- Electoral Divisions (EDs)
- Turbine Delivery Route EDs
- Grid Connection EDs
- BEMP Lands

TITLE:	Study Area		
PROJECT:	Ballinagree Wind Farm		
FIGURE NO:	11.1		
CLIENT:	Coillte and Ørsted		
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11.3 Population

Population relates to the people living in an area. Assessing the demographic makeup of an area can reveal insightful information to guide environmental considerations of a proposed development. This section provides an overview of the population profile for the Study Area, County Cork and the State between the Census years of 2006 and 2016 in order to create a baseline demographic profile of the receiving environment and identify potential impacts on demographic trends arising as a result of the proposed project.

The study area for the purpose of assessing population has been chosen based on Electoral Divisions (EDs) within which the proposed project is located. As illustrated in Figure 11-1, this encompasses the EDs as set out in Table 11-1:

Table 11-1: Electoral Divisions Associated with the Study Area

Electoral Division of the Study Area		
Main Wind Farm Site	TDR	Grid Connection
Kilberrihert	Kilberrihert	Kilberrihert
Rahalisk	Kilcorney	Rahalisk
Mountrivers	Drishane	
Crinnaloo	Rathcool	
Nad	Keale	
	Rosnalee	

11.3.1 Existing Environment - Population

Population Growth

The proposed project is located in north west County Cork on the southern slopes of the Boggeragh Mountains, north of the town of Ballinagree and south east of Millstreet. The area is predominantly rural in character consisting of one-off houses focused around the local road network.

According to Eircode data 2020, there are 60 no. residential dwellings within 1.55km of the turbine locations¹. Of these 60 dwellings, 10 no. are also registered as commercial (farmsteads). There is one permitted dwelling yet to be constructed within 1.55km of the proposed turbine locations. Figure 11-2 illustrates the residential receptors within the vicinity of the Main Wind Farm Site according to Eircode (2020) and Geodirectory data. This information is supported by the ground proofing survey and planning application search. Furthermore, there are approximately 21 no. one-off houses along the 10.6km grid route.

Population statistics for the State, Cork County and the 'Study Area' (EDs associated with the proposed wind farm site, grid route and TDR) are set out in Table 11-2.

¹ Based on straight line distances from centre of the proposed turbine locations



Table 11-2: Population Statistics 2006-2016

Area	Population			% Population Change		
	2006	2011	2016	2006-2011	2011-2016	2006-2016
State	4,239,848	4,588,252	4,761,865	8.2%	3.8%	12.3%
Cork County	361,877	399,802	417,211	10.5%	4.4%	15.3%
Main Wind Farm Site	1988	2243	2360	12.8%	5.2%	18.7%
TDR	3642	4212	4266	15.6%	1.3%	17.1%
Grid Route	1045	1201	1287	14.9%	7.2%	23.1%

The data presented in Table 11-2 demonstrates that the population around the Main Wind Farm Site, TDR and Grid Route increased by an average of 14.4% between the 2006 and 2011 census years, with stronger growth in comparison to the State and County Cork. This growth greatly reduced between 2011 and 2016, however the growth rate around the Main Wind Farm Site and Grid Route remained higher than the State and County averages.

Population Density

The population density recorded within the State, County Cork, the Main Wind Farm Site, Grid Route and TDR during the 2006, 2011 and 2016 Census are set out hereunder in table 11-3. Overall, the population density of the Main Wind Farm Site, TDR and Grid Route areas have a low population density associated with sparse rural settlement. This is contrast to the State-wide and County-wide population densities which show a higher figure.

The population density of the Main Wind Farm Site and Grid Route areas have increased at a similar rate over the period from 2006 and 2016 by 2.2 and 2.5 persons/sqr km, respectively. In contrast, the TDR area, State and County densities have increased between 4 and 8 persons/sqr km over the same ten-year period.

The 2016 population density of the Main Wind Farm Site is 75% lower than the average County-wide population density and 80% lower than average population density of the state. Similarly, the 2016 population density of the Grid Route area is 76% lower than the County-wide average and 80% lower than the average population density of the state.

The TDR area has a higher population density than that of the Main Wind Farm Site and Grid Route area, due to the presence of the Millstreet urban settlement which the route passes through. The TDR area has a population density approximately 50% greater than that of the Main Wind Farm Site and Grid Route area. The population density of the project area as a whole remains significantly lower than that of the County and the State.

The population density of the Main Wind Farm Site, TDR and Grid Route for the 2016 Census year is illustrated in Figure 11-3.



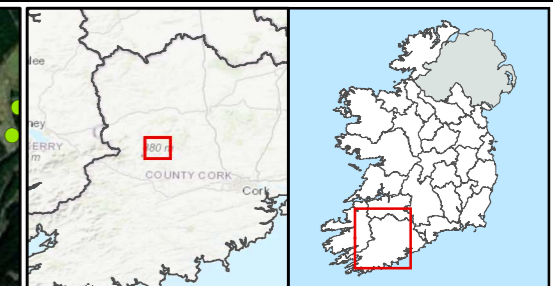
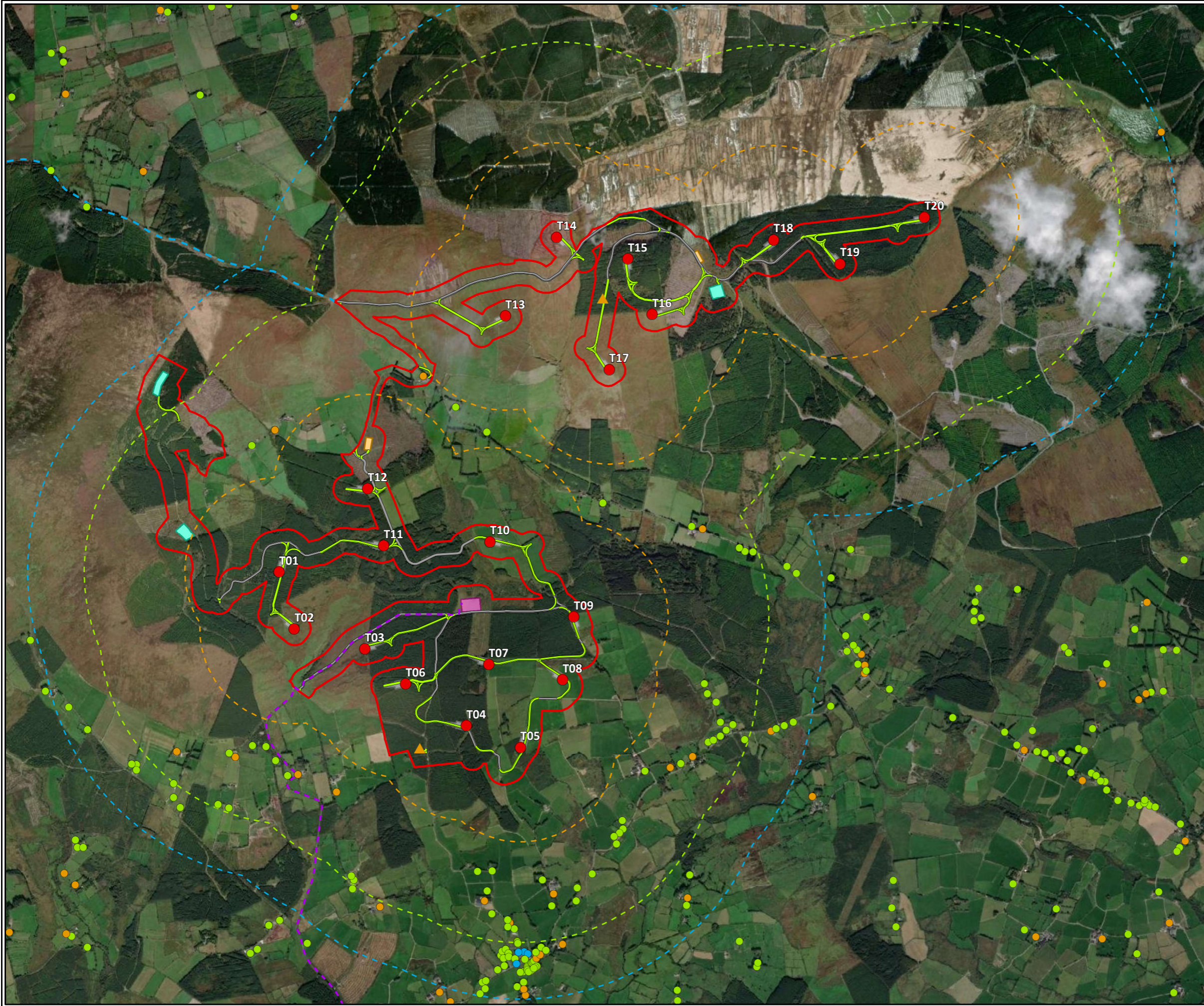
Table 11-3: Population Density between 2006 – 2016 (Persons per square kilometre)

Area	Population Density (Persons per square kilometre) 2006	Population Density (Persons per square kilometre) 2011	Population Density (Persons per square kilometre) 2016
State	60.3	65.3	67.8
Cork County	48.2	53.3	55.6
Main Wind Farm Site	11.5	13	13.7
TDR	23	26.7	27
Grid Route	10.6	12.2	13.1

Population - Existing Environment

As demonstrated above, the Main Wind Farm Site of the proposed Ballinagree Wind Farm Project is a rural area, with low population numbers and low population density when compared to the averages of the State and County Cork. Similarly, the grid route area has a low rural population density, while the TDR area has a greater density due to the presence of the Millstreet urban settlement which the TDR passes through. Overall, the Main Wind Farm Site and Grid Connection have a low population density associated with their rural nature, whereas the TDR has a higher population density associated with its proximity to a built-up area.

The baseline population statistics presented above do not show any substantial rise or fall in population trends and therefore the study area is considered stable with respect to population growth and population density.



Legend

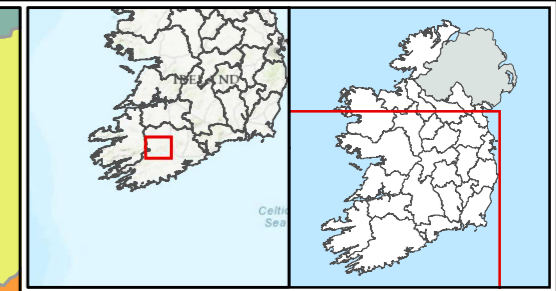
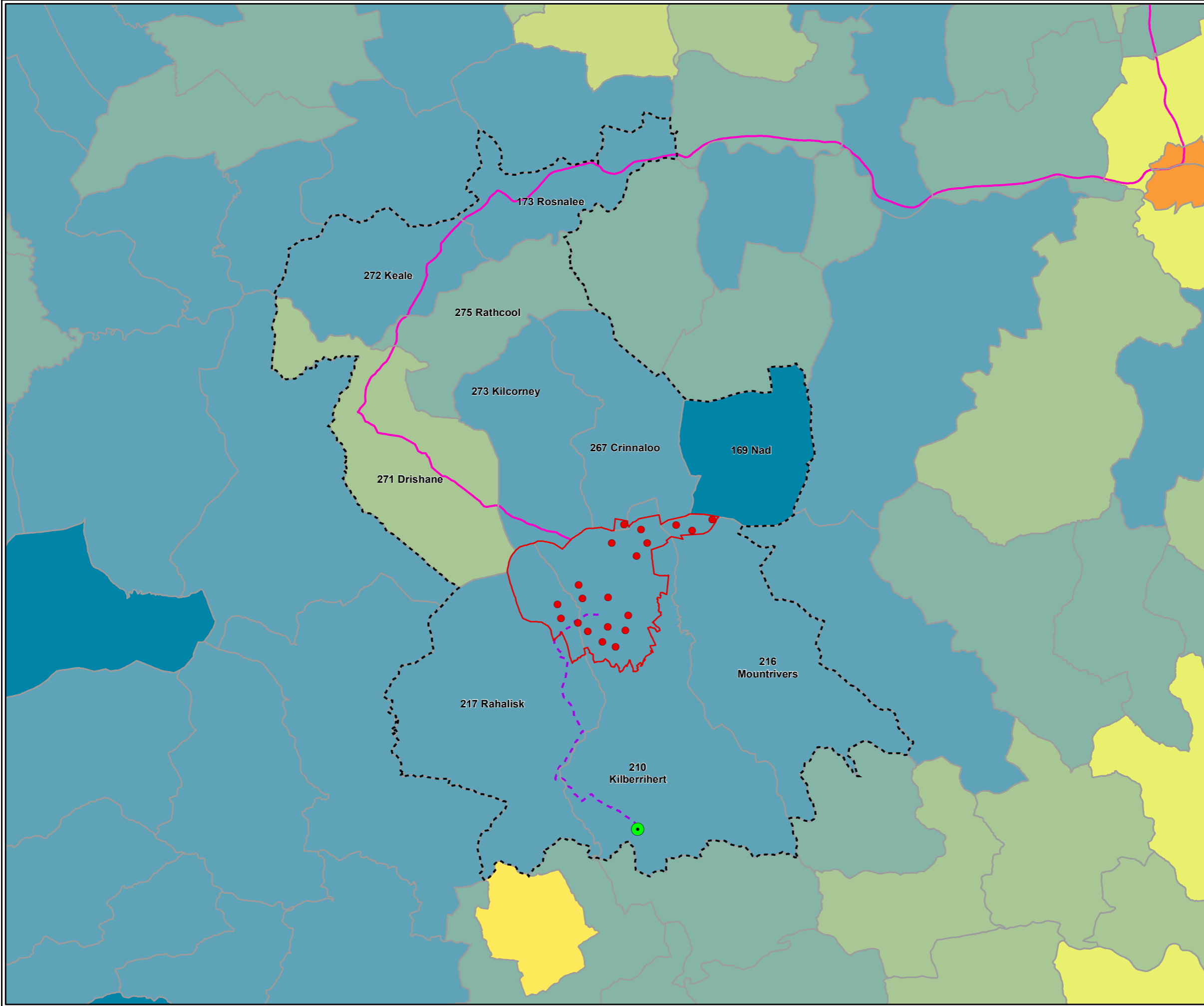
- Development Boundary
- 750m Buffer of Turbine Layout
- 1.55km Buffer of Turbine Layout
- 2km Buffer of Turbine Layout
- Proposed Turbine Layout
- ▲ Met Mast
- Grid Connection
- Turbine Delivery Route
- Existing Track Upgrade
- New Access Track
- Construction Compound
- Turbine Hardstanding Area
- Substation Compound
- Proposed Borrow Pits

Receptors:

- Residential
- Commercial
- Residential and Commercial

TITLE:	Nearby Residential Receptors
PROJECT:	Ballinagree Wind Farm
FIGURE NO:	11.2
CLIENT:	Coillte and Ørsted
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Legend

- Proposed Turbine Layout
- Clashavoon Substation
- Turbine Delivery Route
- - - Grid Connection
- ▭ Proposed Wind Farm Site
- - - Study Area
- ▭ Electoral Divisions

Population Density 2016 by Electoral Division:

- 1 - 10
- 11 - 25
- 26 - 50
- 51 - 75
- 76 - 100
- 101 - 250
- 251 - 500
- 1001 - 2000

TITLE: Population Density of Study Area (2016)	
PROJECT: Ballinagree Wind Farm	
FIGURE NO:	11.3
CLIENT:	Coillte and Ørsted
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11.3.2 Potential Impacts on Population - Construction

The potential effects on population and demographic trends arising from the proposed project during its construction phase relate to potential population increase or decrease.

During the construction phase of the project, it is likely that many of the workers travelling to the site will do so from outside of the area. This is due to the large numbers expected to be employed at the project site. It is expected that workers from the locality within the immediate area will also be employed, however, the relatively low population available in the area, combined with a high percentage of employed persons, as identified in Table 11-5 in the following section, indicates that there is a limited available work force in the project area and therefore many workers employed at the construction site are likely to travel from the surrounding catchment of County Cork.

This will give rise to short-term/brief population growth in the Main Wind Farm Site study area during working hours. This is associated with the direct employment of construction workers, trades people, labourers and specialised contractors. The construction phase of the wind farm site has potential to create between approximately 126 and 188 direct and indirect jobs based on research. The employment projections are set out in section 11.4.2. Of the projected employment, it is anticipated that an average workforce of 30 people will be directly employed at the wind farm site throughout the construction phase, increasing to 60 employees during peak periods.

The population of the Main Wind Farm Site recorded in the 2016 Census was 2360 persons. An estimate of between 30 and 60 jobs associated with the construction works has potential to increase the population of the Main Wind Farm Site by between 1.3% and 2.5%. However, this increase is associated with daily construction works and therefore the population of the Main Wind Farm Site will increase daily during construction hours and return back to normal outside of working hours resulting in a brief increase to population numbers on a daily basis over the 18-24 month construction period. As construction work is temporary, it is unlikely that workers will take up residence in the area of the Main Wind Farm Site, however, it is likely that some workers will stay in accommodation within the Study Area or at nearby towns. Overall, this will result in a slight, short-term increase in population resulting in a slight, short-term neutral impact.

The construction works associated with the grid route will be undertaken on a rolling basis with short sections of road closed for short periods before moving onto the next section. It is expected that these works will be conducted over a 6-month period. Population of the Grid Connection area will receive a slight increase in numbers during working hours. However, due to the transient nature of the grid route works, this is expected to have an insignificant temporary and neutral impact on the population of the Grid Connection area.

Similarly, the temporary accommodation works associated with the TDR route are limited to 22 no. points along the route. It is expected that there will be a slight increase in numbers at these points along the TDR route during working hours for the construction of the accommodation works and temporary removal of furniture/signage/poles, however, as the works are limited, this temporary increase in population is considered brief to temporary and insignificant.

It is unlikely that permanent impact to population in the Main Wind Farm Site, TDR or Grid Connection will occur, in terms of changes to population trends or population density as a result of the construction phase.



11.3.3 Potential Impacts on Population - Operational

Once constructed, it is envisaged that there will be direct and indirect employment associated with the operational phase of the proposed project. Opportunities for mechanical-electrical contractors and craftspeople to become involved with the operation and maintenance of the project will arise.

As set out in section 11.4.3 it is expected that the operational phase of the proposed development (wind farm site) could create between 35 and 47 long term jobs (with an installed capacity of between approximately 118 and 132MW). These jobs include operations and maintenance, back office support and indirect jobs created by other activities related to installed turbines including IPP/utilities, consultancy firms, research institutions, universities and financial services.

Although only a small proportion of these jobs are likely to be based in the Main Wind Farm Site, the operational phase will give rise to temporary, slight population increase in the Main Wind Farm Site during working hours as a result of operations and maintenance occurring at the site. This impact is expected to be imperceptible.

It is unlikely that the population of the Grid Connection and TDR will be impacted during the operational phase of the Ballinagree Wind Farm as further works and activities in these areas are not envisaged.

11.3.4 Potential Impacts on Population - Decommissioning

The decommissioning phase of the proposed project is described in Section 3.8 of this EIAR and provides for the removal of turbines and associated infrastructure from the site. The potential impacts associated with the decommissioning phase in relation to population trends will be similar to those associated with construction phase but of a reduced magnitude.

A construction crew will be required for dismantling the infrastructure and carrying out remediation where necessary. As the decommissioning of the project is expected to be less intensive than the construction phase, it is likely that less construction workers will be required for this phase. During the decommissioning phase, the population of the Main Wind Farm Site will increase daily during working hours and return back to normal outside of working hours.

As removal works will be of relatively short duration, it is unlikely that workers will take up residence in the Main Wind Farm Site, however, it is likely that some workers will stay in accommodation within the area of the Main Wind Farm Site or nearby towns, resulting in potential temporary population increases. The decommissioning phase is therefore likely to result in a slight, temporary increase in population within the Main Wind Farm Site and nearby towns, producing a slight temporary impact on population trends. It is not likely that the decommissioning phase will result in any permanent impact to population in terms of changes to population trends and density.

The grid route element of the project will remain in situ following decommissioning. There is no expected impact on population trends in the Grid Connection area as a result of the decommissioning phase. Similarly, there is no expected impact on population trends across the TDR as a result of the decommissioning phase.

11.3.5 Mitigation Measures - Population

As there are no significant impacts predicted on population trends and population density, no mitigation measures are required.



11.3.6 Residual Impacts - Population

The residual effects of the proposed project with respect to population are associated with operation and maintenance jobs during the operational phase of the Ballinagree Wind Farm. This is likely to result in a temporary slight, neutral impact on population statistics due to population increase in the Main Wind Farm Site during working hours. As per the assessment of operational impacts, any impact to the population of the Main Wind Farm Site in terms of changes to population trends will be imperceptible. It is therefore unlikely that long term residual impacts will occur to population and demographic trends as a result of the proposed project.

11.4 Socio-economics, Employment and Economic Activity

This section provides a comprehensive overview of the socio-economic, employment and economic activity associated with the receiving environment, including the Main Wind Farm Site, TDR, Grid Connection, together with County Cork itself and the State as a whole. This provides an understanding of the overall socio-economic profile of the receiving environment and the potential effects arising from the proposed Ballinagree Wind Farm.

11.4.1 Existing Environment – Socio-economic, Employment and Economic Activity

Live register data (CSO, 2019) provides information relating to the number of people registering for Jobseekers Benefit, Jobseekers Allowance, or for various other statutory entitlements. The figure is useful to gauge unemployment estimations for an area, however, it is noted that the Live Register data includes part-time workers (working up to three days per week), seasonal workers and casual workers who are entitled to Jobseekers Benefit or Jobseekers Allowance and therefore, cannot be relied upon entirely for conclusive employment data. Furthermore, 2020 has seen a significant increase in unemployment throughout the country due to the COVID-19 pandemic. Live register data is presented below in Table 11-4 for the State and County Cork.

Table 11-4: Live Register Data for Cork County and the State March 2018 – March 2021

	March 2018	March 2019	March 2020	March 2021
Cork County	20,582	15,598	15,810	14,764
State	232,366	192,407	205,209	183,096 ²

Note: at the time of the writing of this Chapter, the latest live register figures available were for March 2021

Between 2018 and 2021 unemployment trends in County Cork and the State as a whole experienced a significant reduction, where numbers recorded on the live register dropped by 21% throughout the State and 23% in County Cork. Likely part-due to the negative economic impact associated with COVID-19, numbers of people on the live register increased from 2019 to 2020 figures by 7% across the State and by 1.5% across County Cork. These numbers have since decreased by 10.6% across the State and by 6.6% across County Cork between March 2020 and March 2021.

² Totals for 2021 do not include persons in receipt of the Pandemic Unemployment Payment (PUP)



Taking account of 2016 Census population figures as detailed in section 11.3.1, this represents an unemployment rate of 4% across the State, and an unemployment rate of 3.5% across County Cork, indicating a greater average unemployment for the State as a whole compared to County Cork.

The Census (2016) has published figures of Ireland’s working population aged 15 to 64 for Electoral Divisions, allowing for a greater insight into the Study Area’s socio-economic profile. The basic indicator for employment is the proportion of the working-age population aged 15-64 who are employed. Table 11.5 below sets out the percentage of the total population aged 15+ who were in the labour force during the 2016 Census. Table 11.5 also sets out those who were not in the labour force, this includes students, retired people, those unable to work, persons performing home duties etc.

Table 11-5: Economic Status of the Total Population Ages 15+ in 2016

	Status	State	County Cork	Main Wind Farm Site	TDR	Grid Connection
% of Population aged 15+ which are:	At Work	53%	56%	56.5%	57.5%	57%
	First time job seeker	1%	1%	0.5%	0.5%	0.5%
	Unemployed	7%	5%	4.5%	5%	4.5%
	Student	11%	11%	12%	11%	12.5%
	Home duties	8%	9%	11%	8%	10%
	Retired	15%	14%	12%	13.5%	12%
	Unable to work	4%	4%	3%	4%	3%
	Other	0%	0%	0.5%	0.5%	0.5%

As set out in Table 11-5, overall, the principle employment status in 2016 across the State, County Cork, Main Wind Farm Site , TDR and Grid Connection is “at work” with between 56% and 57.5% at work across County Cork and the Study Area. This indicates a stronger employment rate across the Study Area which is approximately 4 percentage points higher than the State figures. Similar figures are recorded across the Main Wind Farm Site, TDR and Grid Connection. A slightly higher percentage of retired persons is recorded in the TDR area and a slightly higher percentage of students and persons with home duties is recorded in the Main Wind Farm Site and Grid Connection when compared to the TDR area.

The Census (2016) also indicates the employment composition of Electoral Divisions, an important element of the socio-economic profile of an area. As detailed in Table 11-6, the employment sectors for each of the areas show similarities with professional services being the largest share in most areas. The study area has a lower percentage of employment from commerce and trade in comparison to the State and County Cork. Within the study area, the TDR has a lower percentage of employment relating to agriculture, forestry and fishing compared the Main Wind Farm Site and Grid Connection, and the TDR also has a higher rate of employment from manufacturing industries, likely due to the Millstreet Urban Area where the TDR passes through.



Table 11-6: Industry Distribution by Area

Persons at Work by Industry	State	County Cork	Main Wind Farm Site	TDR	Grid Connection
Agriculture forestry & fishing	4%	16%	18%	12%	18%
Building & construction	5%	6%	7%	5%	6%
Manufacturing industries	11%	10%	14%	21%	13%
Commerce and trade	24%	21%	16%	15%	16%
Transport and communications	9%	6%	6%	6%	7%
Public administration	5%	6%	5%	3%	5%
Professional services	24%	24%	22%	20%	22%
Other	18%	12%	12%	18%	13%

Overall, the economic profile of the Main Wind Farm Site, TDR and Grid Connection does not show any major disparities when compared to the National and County-wide average socio-economic statistics. County Cork has a slightly lower unemployment rate compared to the State. This is reflected in the unemployment numbers recorded in the 2016 Census for the study area which are on average lower than the State and County Cork, ranging from 4.5% to 5%. The Main Wind Farm Site, TDR and Grid Route show no major disparities in the distribution of employment sectors when compared the State and County Cork. In general, the baseline conditions of the study area shows healthy socio-economic characteristics.

Employment activities within the Study Area consists mainly of agriculture and forestry as detailed in Section 11.5: Land Use. Centres of employment in the greater area include Millstreet and Macroom which have a range of town centre services and industry. Smaller villages in proximity to the study area including Ballinagree, Carriganimmy, Rylane, Stuke/Donoughmore and New Tipperary and Aubane support local shops, pubs and food places.

11.4.2 Potential Impacts – Socio-economics, Employment and Economic Activity - Construction

The site preparation and installation of the Ballinagree Wind Farm will create temporary employment within the study area.



According to Institute for Sustainable Futures document (2015), 3.2 jobs are created per MW of wind energy development during the construction and installation phase, the report assumes a 2 year construction period. Based on this employment estimate and an approximate two-year construction phase, approximately 188 jobs could be created during the construction phase (for an installed capacity of between 118MW and 132MW).

According to the European Wind Energy Association's (EWEA) Report 'Wind at Work' (2009), 1.2 jobs per MW are created during installation of wind energy projects based on 1 year construction period. Using this figure, a projection of approximately 140 jobs could be created as a result of the construction of the proposed development (for an installed capacity of between 118MW and 132 MW).

The Sustainable Energy Authority of Ireland' 2015 report 'A Macroeconomic Analysis of Onshore Wind Deployment to 2020' puts direct construction jobs from wind farm developments at 1.07 jobs per MW based on 1 year of construction. Using this figure, a projection of approximately 126 jobs could be created as a result of the construction of the proposed development (for an installed capacity between 118MW and 132 MW).

Therefore, considering the minimum and maximum figures, it is estimated that between 126 and 188 direct and indirect jobs could be created during the construction phase of the proposed project. It is not expected that all of these jobs will be based at the wind farm site, however, the employment of tradespeople, labourers, and specialised contractors for the construction phase will have a direct, short-term significant, positive impact on employment in the study area.

It is likely that there will be direct employment for people living in the Study Area who may be qualified for construction related roles. Materials will also be sourced in the general locality where possible. This will assist in sustaining employment in the local construction trade. Furthermore, local businesses in the nearby towns of Macroom and Millstreet and the villages of Ballinagree, Carriganimmy, Rylane, Stuake/Donoughmore and New Tipperary and Aubane will likely receive a slight indirect positive economic impact due to the influx of workers to the area who will require services such as shops and food places.

As a result, the construction phase of the proposed development will have a short-term, significant positive impact on the employment profile of the area and a short-term slight, positive impact on local businesses and services in the nearby towns and villages of the Study Area.

11.4.3 Potential Impacts – Socio-economics, Employment and Economic Activity - Operational

11.4.3.1 *Economic Value & Employment Potential*

The proposed project will contribute to achieving Ireland's energy targets as set out in the Climate Action Plan 2021, which has a target of 80% of electricity generated from renewable sources by 2030. With a target increase in onshore wind of 8GW by 2030, the Ballinagree Wind Farm has the potential to contribute to between 2.95% and 3.3% of the additional capacity (ca. 4 GW) required to achieve this 2030 national target.

The Sustainable Energy Authority of Ireland's (SEAI) Energy in Ireland 2020 Report states that wind energy provided Ireland with 32% of its electricity in 2019, up nearly 4% on 2018 figures. The use of renewables in electricity generation reduced CO₂ emissions by 4.8 million tonnes in 2019, avoiding approximately €297 million in fossil fuel imports for that year. It is estimated that wind energy alone resulted in the avoidance of approximately €248 million in fossil fuel imports and avoided 3.9 million tonnes of CO₂ emissions in 2019. These savings will continue to rise with the installation of further wind energy and other renewable energy developments. Increased renewable electricity production as a result of the operational phase of the proposed development will have a likely positive medium to long-term economic impact due to the avoidance of fossil fuel imports.



Once the proposed Ballinagree Wind Farm is constructed, it is envisaged that there will be direct and indirect employment associated with the operational phase of the proposed development. Opportunities for mechanical-electrical contractors and craftspeople to become involved with the operation and maintenance of the project will arise.

According to the European Wind Energy Association's (EWEA) Report 'Wind at Work' (2009), 0.4 long-term jobs are created per MW of total installed capacity. These jobs include operations, maintenance, back office support and indirect jobs created by other activities related to installed turbines including IPP/utilities, consultants, research institutions, universities and financial services.

A study carried out by the Institute for Sustainable Futures (2015) estimates that the operational and maintenance job output for a wind farm is 0.3 jobs per MW of total installed capacity based on an average of 7 studies examined. SEAI's 2015 report 'A Macroeconomic Analysis of Onshore Wind Deployment to 2020' estimates 0.34 jobs per MW for operations and maintenance of new wind turbines and in the wider electricity supply sector.

Therefore, using these estimates and considering an installed capacity of between 118MW and 132 MW, the operational phase of the proposed Ballinagree Wind Farm could produce between 35 and 47 jobs.

Although only a small proportion of these jobs are likely to be directly based in the Main Wind Farm Site, it is likely that the indirect jobs the operational phase will support, such as consultants, research institutions, universities and financial services, will provide an indirect, long-term slight, positive impact to the employment profile of the wider economy of County Cork. It is likely that there will be direct employment available for people living in the Study Area who may be qualified for jobs associated with operation and maintenance. It is therefore considered that the operational phase of the proposed development has potential for an indirect, long-term slight, positive impact on employment in the Study Area, nearby towns and wider County Cork.

Rates and development contributions paid by the developer will contribute significant funds to Cork County Council which will likely be used to improve the services available to the people of the County. Business rates will also contribute significantly throughout the lifetime of the windfarm. General council services will benefit from rates and development contributions which include road upkeep, fire services, environmental protection, street lighting, footpath works etc., along with other local community initiatives and supports. The payment of rates and development contributions is likely to have a slight positive, long-term impact on resources of the Local Authority during the operational phase.

The terms of the Renewable Energy Support Scheme states that all projects looking for support under the new RESS will need to meet pre-qualification criteria including the provision of a community benefit fund. This is discussed further in the following section.

11.4.3.2 Proposed Community Benefit Scheme

As set out in the terms of the Renewable Energy Support Scheme (RESS), all renewable energy projects applying for RESS will require a Community Benefit Fund prior to commercial operations of the project. The contribution for RESS 1 (2020), the first renewable energy auction under the new support program, required a contribution of €2/MWh for all projects. Furthermore, as part of RESS 1, the Community Benefit Fund will provide a minimum payment per annum of €1,000 to all dwellings located within a distance of 1 kilometre radius from RESS 1 projects and a minimum of 40% of the funds shall be paid to not-for-profit community enterprises, focusing on education, energy efficiency, sustainable energy and climate action, in line with UN Sustainable Development Goals, 4, 7, 11 and 13.



A draft Good Practice Principles Handbook was published in March 2021 setting out a range of principles, including the need to ensure community participation in fund decision-making via the establishment of a local committee which should ensure successful dispersal of funds throughout the community.

The applicant aims to develop long-life assets in such a way to ensure long-term benefits to the local community and economy are created and sustained. The applicant expects that for each megawatt hour (MWh) of electricity produced by the wind farm, the project will contribute €2 into a community benefit fund for the RESS period i.e. the first 15 years of operation and €1 per MWh for the remaining lifetime of the wind farm. If this commitment is improved upon in upcoming Government Policy, the figures will be adjusted accordingly.

Assuming that the export capacity of the proposed development will be between 118MW and 132 MW and is contracted under the RESS, it is anticipated that the community benefit fund for the proposed Ballinagree Wind Farm has potential to deliver over €600,000 per year to the local community for the first 15 years of operations following the commissioning of the project, and over €300,000 per year for the remaining lifetime of the project.

The provision of the Community Benefit Fund will have a significant long-term, positive impact on the socio-economic profile of the study area and wider area, providing a regular payment to near neighbours of the project and providing for projects which will benefit the community as a whole, bringing long-term socio-economic benefits.

11.4.3.3 Property Values

In the absence of any Irish studies on the effect of wind farms on property values, this section provides a summary of the largest and most recent studies from the United States, UK and Scotland.

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

The main conclusion of this study is as follows:

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

This study has been recently updated by LBNL who published a further paper entitled “A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States”, (Hoen, et al. 2013). This study analysed more than 50,000 home sales near 67 wind farms in 27 counties across nine U.S. states, yet was unable to uncover any impacts to nearby home property values.



The homes were all within 10 miles of the wind energy facilities - about 1,100 homes were within 1 mile, with 331 within half a mile. The report is therefore based on a very large sample and represents an extremely robust assessment of the impacts of wind farm development on property prices. It concludes that:

“Across all model Specifications, we find no statistical evidence that home prices near wind turbines were affected in either the post-construction or post announcement/pre-construction periods.”

Both LBNL studies note that their results do not mean that there will never be a case of an individual home whose value goes down due to its proximity to a wind farm – however if these situations do exist, they are considered to be statistically insignificant. Therefore, although there have been claims of significant property value impacts near operating wind turbines that regularly surface in the press or in local communities, strong evidence to support those claims has failed to materialise in all the major U.S. studies conducted thus far.

A further study was commissioned by RenewableUK and carried out by the Centre for Economics and Business Research (Cebr) in March 2014. Its main conclusions are:

- Overall the analysis found that the county-wide property market drives local house prices, not the presence or absence of wind farms.
- The econometric analysis established that construction of wind farms at the five sites examined across England and Wales has not had a detectable negative impact on house price growth within a five-kilometre radius of the sites.

A relatively new study issued in October 2016 ‘Impact of wind Turbines on House Prices in Scotland’ (Heblich, et al. 2016) was published by Climate Exchange, Scotland’s independent centre of expertise on climate change which exists to support the Scottish Governments policy development on climate and the transition to a low carbon economy.

The report presents the main findings of a research project estimating the impact on house prices from wind farm developments. It is based on analysis of over 500,000 property sales in Scotland between 1990 and 2014. The key findings from the study are:

- No evidence of a consistent negative effect on house prices: Across a very wide range of analyses, including results that replicate and improve on the approach used by Gibbons (2014), they do not find a consistent negative effect of wind turbines or wind farms when averaging across the entire sample of Scottish wind turbines and their surrounding houses. Most results either show no significant effect on the change in price of properties within 2km or 3km or find the effect to be positive.
- Results vary across areas: The results vary across different regions of Scotland. the data does not provide sufficient information to enable them to rigorously measure and test the underlying causes of these differences, which may be interconnected and complex.

Although there have been no empirical studies carried out in Ireland on the impacts of wind farms on property prices, the literature described above demonstrates that at an international level, wind farms have not impacted property values in the local areas. It is a reasonable assumption based on the available international literature, that the provision of a wind farm at the proposed location would not impact on the property values in the area and will therefore have a long-term imperceptible impact.



11.4.4 Potential Impacts – Socio-economics, Employment and Economic Activity - Decommissioning

The potential impacts associated with the decommissioning phase in relation to socio-economics, employment and economic activity will be similar to those associated with the construction phase but of a reduced magnitude.

A construction crew will be required for dismantling the infrastructure and carrying out remediation where necessary. As the decommissioning of the project is expected to be less intensive than the construction phase, it is likely that less construction workers will be required for this phase. During the decommissioning phase employment opportunities will be available at the Main Wind Farm Site and outlying areas. The influx of construction workers to the Main Wind Farm Site will have a temporary to short-term indirect positive impact on local businesses and services contributing to the local economy, similar to that of the construction phase but of lesser magnitude.

There will be a temporary to short-term slight, positive impact to socio-economics, employment and economic activity in the Main Wind Farm Site associated with the employment of construction workers within the vicinity of the development during the decommissioning phase.

11.4.5 Mitigation Measures – Socio-economics, Employment and Economic Activity

Given that potential impacts of the proposed development at construction, operation and decommissioning phases are predominantly positive in respect of socio-economics, employment and economic activity, no mitigation measures are considered necessary.

11.4.6 Residual Impacts – Socio-economics, Employment and Economic Activity

The residual impact of the development with respect to socio-economics is considered to be slight positive impact with respect to employment. This is as a result of the employment opportunities associated with the operation and maintenance of the development. There will also be a temporary slight positive economic impact from income spent by construction workers in the local area.

As detailed in section 11.4.3.2, the Community Benefit Fund associated with the Renewable Energy Support Scheme (RESS) will provide a significant long-term, positive impact to socio-economic profile of the Main Wind Farm Site and greater community.

The terms of the Community Benefit Fund will also promote social-inclusion across the community as a minimum of 40% of the funds shall be paid to not-for-profit community enterprises, focusing on UN Sustainable Development Goals, 4, 7, 11 and 13 which include education, energy efficiency, sustainable energy and climate action.

Rates payments and development contributions have potential to improve service provision throughout County Cork and in the local area. This will likely have a slight positive, residual impact on resources of the Local Authority.

A positive residual impact is also envisaged in that wind energy decreases the cost of electricity. A cost benefit analysis of wind energy in Ireland was published by Baringa in association with IWEA in January 2019 (Baringa, 2019). The study indicates that the more renewable energy (low-cost) produced, the less dependency on fossil fuels is required which costs more per MW.



The report states that the savings involved with wind energy outweigh the amount of funding provided to support wind energy through the public service obligation levy, therefore the more wind power produced, the less electricity will cost. The proposed project will result in a slight long-term positive impact for electricity users throughout the country.

Overall, the residual impact associated with socio-economics, employment and economic activity as a result of the proposed development is considered long-term significant and positive.

11.5 Land Use

This section assesses the compatibility of the land use of the proposed project with the current land use. The determination of the potential effects on the existing land use is assessed for the construction, operation and decommissioning phases of the proposed project. Potential impact on sensitive land uses in the area of the proposed development have been examined in this section.

11.5.1 Existing Environment – Land Use

The proposed Ballinagree Wind Farm site is located in an area of coniferous forestry and areas of third party agricultural lands. The forestry on-site is managed by Coillte and has an ongoing maintenance, felling and replanting schedule which has a programme to continue for the foreseeable future. There is an existing network of forestry tracks for access to the lands. The agricultural practice at the site consists mainly of pasture farming. There are also areas of peat bog located in proximity to the site. The greater area consists of one-off houses and farmsteads. There are 60 no. dwellings within 1.55km of the proposed wind turbine locations.

The site is in proximity to the Duhallow Way, a national waymarked trail which measures approx. 40 km from Shrone Church, County Kerry to the Village of Bweeng, County Cork. The route runs along the L2758 Butter Road between the two turbine clusters before turning north and crossing a section of proposed upgraded track within the wind farm site. Other forestry tracks in the area of the wind farm site are used for recreational hiking and walking as part of Coillte's open forestry policy.

According to the Corine Landcover Database (2018) and confirmed by investigation surveys carried out during environmental assessment, the site consists of the following landcover:

- Agricultural areas consisting of pastures (Corine Code 231)
- Coniferous forestry and semi-natural areas (Corine Code 312)
- Transitional woodland scrub (Corine Code 324)
- Wetlands peat bog (Corine Code 412)

The site is also in close proximity to areas of land principally occupied by agriculture with areas of natural vegetation (Corine Code 243) located to the south of the site.

Adjacent to the proposed wind farm site to the north and to the east is the existing Boggeragh Wind Farm which consist of 39 no. wind turbines. The Boggeragh proposed Natural Heritage Area is located adjacent to the north east of the site. This area is protected upland blanket bog habitat.

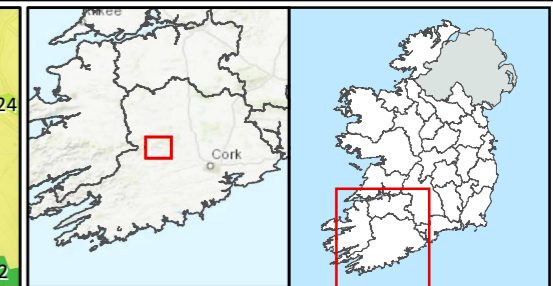
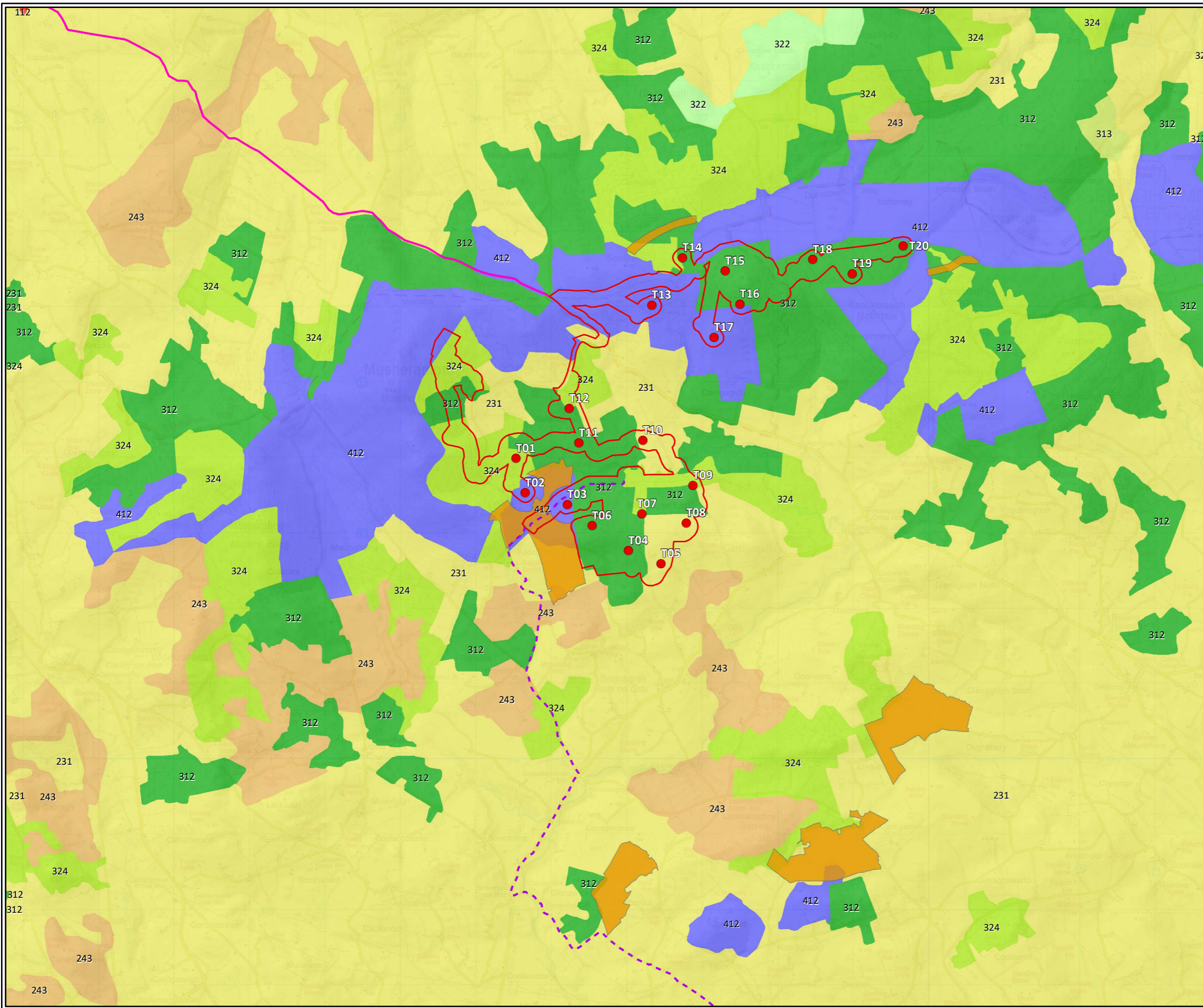


Four private landowners with a combined total of c. 304 ha of lands in the vicinity of the wind farm, but beyond 250m of any proposed turbine, have agreed to a long-term commitment to detailed land management measures designed to maintain and enhance local biodiversity. In addition, the co-developer Coillte has undertaken to create wildlife corridors through strategic tree-felling between areas of upland habitat in the vicinity of the proposed wind farm area. The dominant habitat across these land holdings is Improved Agricultural Grassland (GA1). Areas of degraded Wet Heath (HH3) and Cutover Bog (PB4) were present on some of the lands.

The proposed grid route connection will be installed in the public road. Land use observed along the grid route consists of pasture farmlands with intermittent areas of forestry and one-off houses. This is in line with the Corine Landcover data which shows the grid route extending over agricultural areas and transitional woodland scrub. There are 21 no. one-off houses along the 10.6km grid route. The proposed point of connection to the national grid is the Clashavoon Substation which is a long-standing electricity substation located in an area of farmland.

The TDR begins at Foynes Port in County Limerick and follows national primary routes before entering onto the R583 regional route. From this point, land use consists of agricultural pasture with intermittent areas of forestry. The TDR passes through the urban area of Millstreet before turning onto the L2758 for the approach to the site. This area also consists of agricultural pasture with areas of natural vegetation and coniferous forestry where the TDR reaches the proposed wind farm site. The land uses along the TDR in the Millstreet urban area include residential, guesthouses, ecclesiastical uses and retail.

The Corine Landcover mapping for the Main Wind Farm Site, TDR and Grid Connection is illustrated in Figure 11-4.



Legend

- Proposed Turbine Layout
- - - Grid Connection
- Turbine Delivery Route
- Development Boundary
- BEMP Lands

CORINE Land Cover 2018:

- 112 Discontinuous urban fabric
- 231 Pastures
- 243 Land principally occupied by agriculture with areas of natural vegetation
- 312 Coniferous forest
- 313 Mixed forest
- 322 Moors and heaths
- 324 Transitional woodland scrub
- 412 Peat bogs

TITLE:	Corine Land Cover		
PROJECT:	Ballinagree Wind Farm		
FIGURE NO:	11.4		
CLIENT:	Coillte and Ørsted		
SCALE:	1:50000	REVISION:	0
DATE:	07/12/2021	PAGE SIZE:	A3

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11.5.2 Potential Impacts – Land Use - Construction

The existing land-uses in proximity to the proposed Ballinagree Wind Farm will remain broadly unchanged during the construction phase of the project, however, some land use in close proximity to the site will be temporarily disrupted during the construction phase. This will occur on the forestry lands and the agricultural lands where turbines and associated infrastructure are proposed.

There are 10 no. proposed wind turbines located within commercial forestry areas and 10 no. proposed turbines located on pasture lands. There are 3 no. proposed borrow pits located within forested lands. Existing access tracks will be utilised and upgraded where possible and new tracks will be required in both forested lands and agricultural lands. This will result in temporary interruption to these lands during the construction phase.

Felling of approximately 88 hectares of coniferous forestry is required within and around the wind farm infrastructure to accommodate the construction of the turbines, hardstands and crane pads, access tracks, on-site substation and construction compound. Felling will also be required for some of the BEMP lands. This will result in a long-term moderate, negative impact to forestry in the area.

Inline with the Forest Service's published policy on granting felling licenses for wind farm developments, areas permanently cleared of forestry for turbine bases, access roads, and any other wind farm related uses will have to be replaced by the planting of forestry at an alternative locations. The Forest Service policy requires replacement on a hectare for hectare basis.

Detailed consideration of the approach to afforestation requirements associated with the project is attached in Appendix 1.3. It should be noted that the clearfelling of trees in the State requires a felling licence. The associated afforestation of alternative lands equivalent in area to those lands being permanently clearfelled is also subject to licencing ('afforestation licencing'). The Forest Service of the Department of Agriculture, Food & the Marine is Ireland's national forest authority and is responsible for all forest licencing. In light of the foregoing and for the purposes of this project, the developer commits that the location of any replanting (alternative afforestation) associated with the project will be greater than 10km from the wind farm site and also outside any potential hydrological pathways of connectivity i.e. outside the catchment within which the proposed project is located. On this basis, it is reasonable to conclude that there will be no more than imperceptible indirect or in-combination effects associated with this replanting. In addition, the developer commits to not commencing the project until both felling and afforestation licences are in place and this ensures the afforested lands are identified, assessed and licenced appropriately by the relevant consenting authority.

Forestry activity at the site will cease during the construction phase resulting in a short-term slight, negative impact to existing land use at the wind farm site, however, activity in adjacent areas of forestry can continue during the construction phase.

Access to a section of the Duhallow Way National Waymarked Trail will be temporarily disrupted during the construction phase of the proposed development. This section of the trail is located to the east of T15 and T16 at the north eastern section of the proposed wind farm site. Furthermore, public access under Coillte's open forestry policy to forested areas within and in proximity to the proposed wind farm site will be temporarily closed during the construction period. This will result in moderate short-term, negative impact to recreation land use in and around the wind farm site.

Temporary effects on land use will arise as a result of the installation of the grid connection along the grid route which will be constructed within the public road corridor. Full road closures will be put 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.



This will result in temporary slight, negative impact to residential and agricultural land use where access may be temporarily restricted. Traffic management measures will be put in place as detailed in Chapter 13 of this EIA, resulting in limited disruption to land use along the grid route.

TDR node upgrade activity has potential for slight, brief to temporary impacts to land use in proximity to each node. The majority of works have potential to cause non-significant brief impacts where street furniture and wall removal, temporary load bearing surfaces and vegetation trimming is required. Brief impact may also occur to the supply of electricity and telecommunications to homes and businesses as a result of temporary removal of services to accommodate turbine delivery. TDR Node POI 36 requires land to facilitate transfer from carrier trailers to specialised trailers for manoeuvring blades during transport. This will result in a temporary impact to agricultural lands where a temporary hard surface will be required to accommodate the machinery. Turbine delivery will impact on land use temporarily due to the transportation of oversized loads on the public road. This is likely to have a temporary slight, negative impact on residential land-use due to noise nuisance as a result of machinery. The impact of noise is further considered in Chapter 7 – Noise and Vibration.

11.5.3 Potential Impacts – Land Use - Operation

Given that the footprint of the proposed development will occupy a small proportion of the development site area when operational, as illustrated in figure 11-4, it is anticipated that there will be minimal impact on existing land uses arising from the operational phase.

The operational phase of the Ballinagree Wind Farm will result in a change of land use in areas where access tracks, wind turbine bases, hardstanding areas, met mast, substation, recreation trail and associated drainage infrastructure will be located. The lands affected are currently in use for commercial forestry and agriculture. The removal of approximately 88 hectares of commercial forestry lands will have a long-term slight, negative impact on the existing forestry land use, however, the remaining forested area will continue its ongoing commercial maintenance, felling and replanting schedule throughout the operational life of the proposed project.

This felled area will be replanted elsewhere as per the requirements of the Forestry Act. This will act to offset the loss of forested lands.

There will be 10 no. turbine located on or partly on agricultural lands. This will result in the change of use from agricultural pasture land to wind farm use. This will have a long-term slight, negative impact on agricultural land use due to the removal of grazing lands for the duration of the project.

The operational phase of the Ballinagree Wind Farm will not negatively impact on agricultural practices on lands adjacent to the site. There are no peer reviewed studies which indicate that wind energy development has a negative impact on the health of livestock. There are numerous examples of renewable energy developments throughout the country and internationally where livestock coexist and routinely graze in the same fields as wind turbines (AWEA, 2019). This includes the adjacent Boggeragh Wind Farm and nearby Bawnmore Wind Farm which operate adjacent agricultural practices. Existing land-use, such as grazing livestock or crops can continue on the site as normal. As such, there will be no likely significant negative impact to agricultural practice as a result of the proposed development.

It is proposed to upgrade existing agricultural and forestry tracks where possible to avoid additional land take from roads. Where this is not possible, new access tracks have been proposed. These access tracks will be used throughout the operational phase for operation and maintenance of the proposed wind farm. The tracks will also be used for forestry and agricultural practice, providing a long-term slight, positive impact to these land uses through provision of upgraded and new roads infrastructure throughout the site.



The operation phase of the Ballinagree Wind Farm will provide new recreation infrastructure across the wind farm site. The proposed works as described in section 3.5.21 include the re-purpose of farm tracks and forest tracks for community use. It is proposed to provide trail signage and way-markers positioned within the corridor of the proposed trail upgrades. The proposed wind farm temporary construction compound shall be repurposed following construction of the wind farm as a trail head car park and picnic area. The proposed recreation trail will connect to and interact with the existing Duhallow Way National Waymarked Trail. The provision of this recreation infrastructure will have a long-term moderate, positive impact on recreational land use in the area of the wind farm site. Recreational land use is further discussed in Section 11.6 of this Chapter.

Activity is not expected at the Grid Connection and TDR during the operational phase of the proposed project. There is potential for repair works along the grid connection to take place, however, these will likely be brief or temporary and insignificant. It is unlikely that the TDR route will be required during the operational phase of the project, unless in the unlikely event a turbine component requires to be transported for replacement or repair. In this case, there is potential for slight temporary negative impact on residential land-use due to noise nuisance as a result of machinery. There is also potential for temporary restrictions to recreational trail use if this were to take place at the site during the operational life of the proposed development. Therefore, the operational phase will have an unlikely, brief to temporary insignificant, negative impact on the land use of the TDR area.

The Biodiversity and Environmental Management Plan includes a set of land management commitments. Four private landowners with a combined total of c. 304 ha of lands in the vicinity of the wind farm, but beyond 250m of any proposed turbine, have agreed to a long-term commitment to detailed land management measures designed to maintain and enhance local biodiversity. In addition, the co-developer Coillte has undertaken to create wildlife corridors through strategic tree-felling between areas of upland habitat in the vicinity of the proposed wind farm area.

The measures include those designed to protect watercourses, prevent overgrazing and to clear invasive and site inappropriate plants. Higher value habitats will be actively managed to maintain and improve their value and lower value habitats will see specific interventions designed to improve their attractiveness for a wide range of species. Inputs (e.g. fertiliser, herbicide) will be controlled and appropriate planting will increase the available feeding, roosting and nesting cover for wildlife. Certain measures (e.g. control of stocking density) will be universal across the management lands. Other measures (e.g. planting of wildbird cover and native deciduous woodland) will be entirely site specific. The measures proposed take into account the habitats present and their current condition and importance in the local landscape. This will have a positive impact on land-use by enhancing the biodiversity of the area.

11.5.4 Potential Impacts – Land Use – Decommissioning

The decommissioning phase of the proposed development is described in Section 3.8 of this EIA and provides for the removal of turbines and associated infrastructure from the site. The potential impacts associated with the decommissioning phase in relation to land use will be similar to those associated with construction phase but of a reduced magnitude.

Decommissioning works will include removal of all above ground structures including the turbines and met mast. The on-site substation will be taken in charge by Eirgrid / ESB and therefore will remain in situ. The turbine foundations will be covered over and allowed to re-vegetate naturally and access tracks will be left in situ to continue to be used for agricultural, forestry and recreation land uses.



The decommissioning works will require a construction crew on-site and may cause temporary disruption to surrounding land uses. Removal of infrastructure from the site may temporarily impact on forestry and agricultural practices. During decommissioning works forestry and agricultural access tracks within the wind farm site may be in use by construction crews which may temporarily prohibit access to certain areas of forestry or hinder access to areas of agricultural pasture. Impact to these land uses during the decommissioning phase is expected to be temporary to short-term slight, negative.

Similarly, during decommissioning, the works will result in the temporary closure of tracks for recreation activities. This will have a temporary to short-term slight, negative impact on recreation activity in the area.

Forestry practices and recreation activity will also benefit from the upgraded access tracks left in situ throughout the site resulting in a long-term moderate, positive impact on the forestry industry and recreation activity at the site.

The underground grid connection will remain in situ following decommissioning and form part of the national grid. Therefore, impact to land use along the grid route is unlikely during the decommissioning phase.

The BEMP lands are contracted for the duration of the project, thereafter their full control will revert back to the landowner.

11.5.5 Mitigation Measures – Land Use

Mitigation measures for land use are primarily related to preliminary design stage, which has allowed for the prevention of unnecessary or inappropriate ground works or land use alterations to occur. The construction and operational footprint of the proposed development has been kept to the minimum necessary to avoid impact on existing land uses as so far as possible.

Existing forestry tracks have been incorporated into the design in order to minimise the construction of new tracks and roads and minimise the removal of forested areas. Where new access tracks are required, these have been sensitively designed in order to minimise impact on forestry. Electricity cables will be installed underground in or alongside access tracks to avoid impact on forestry practices.

The construction and decommissioning works will be planned and controlled by a Construction and Environmental Management Plan (CEMP). The CEMP for the construction phase is included in Appendix 3.1 of Volume 3 of this EIAR. This provides details on day to day works and methodologies. As part of these works, the public and other stakeholders will be provided with updates on construction activities which will affect access to lands. This will be communicated to members of the public through a community liaison officer employed for the duration of the construction period.

Prior to the grid connection installation works within public roads, it is proposed that all access points (domestic, business, farm) are considered when finalising the temporary road closures and diversions, in order to maintain local access as much as possible and avoid impacts on various land uses. All proposed works and deliveries along the TDR route will also be controlled by a Construction and Environmental Management Plan to avoid undue impact to adjacent land uses.



11.5.6 Residual Impacts – Land Use

Once mitigation measures are in place and the appropriate design measures are incorporated, as proposed, there will be no significant adverse negative residual effects arising from the project on land use. Benefits to forestry and agricultural practices as a result of the upgrading of access tracks throughout the site will cause a moderate, positive impact for forestry and agriculture at this location. Similarly, the provision of new and upgraded recreation infrastructure will likely have a long-term significant, positive impact on recreation land use at the site. The creation of BEMP lands will also have a long-term significant, positive impact.

Other infrastructure that will remain in situ includes turbine foundations and hardstands which will be covered over and vegetated. The on-site substation will be taken in charge by Eirgrid or ESB. The grid route cable will remain in situ and form part of the national grid. The residual impact on land use as a result of the in-situ hardstands, foundations, substation and grid connection following decommissioning is likely to be permanent, imperceptible and neutral due to the small extent of land affected.

The loss of 88 hectares of commercial forestry will have a long-term slight negative residual impact on forestry land use in the area of the proposed wind farm, however, the provision of replant lands consisting of a total area approximately 88 hectares of replanted forestry will result in at least a neutral residual impact on forestry land use at a national scale.

11.6 Recreation, Amenity and Tourism

This section provides a comprehensive overview of the recreation, amenity and tourism value for the study area, County Cork and the State in order to assess the potential effects arising from the proposed development. As 2020 and 2021 have experienced an unprecedented negative impact on international tourism due to the COVID-19 epidemic, this section focuses on statistics from 2018 and 2019 as a reasonable scenario for tourism potential for the County. The preparation of this section had regard to Fáilte Ireland's 'Guidelines on the Treatment of Tourism in an Environmental Impact Statement'. Consultation has taken place with local recreation groups, as detailed in Chapter 5 of this EIAR, in order to thoroughly understand potential affects to recreation activity in the area.

11.6.1 Existing Environment – Recreation, Amenity and Tourism

Tourism is one of the major contributors to the national economy and is a significant source of full time and seasonal employment. Tourism statistics for 2019 as published by Fáilte Ireland (March 2021) state that overseas tourism grew by 0.7% on 2018 figures with over 9.7 million visitors. Expenditure from overseas tourism was estimated to be down by -0.8% remaining strong at €5.1 billion. Fáilte Ireland's 2019 survey results indicate the top 5 most popular recreation activity for tourists in Ireland:

1. Hiking and cross country walking
2. Cycling
3. Golf
4. Equestrian
5. Angling



Fáilte Ireland’s Regional Tourism performance figures for 2018 and 2019 are set out in Table 11-7 and 11-8 for the South West Region which includes Counties Cork and Kerry. As demonstrated in the tables, tourism numbers for the South West Region for both over-seas and domestic trips fell by 6% between 2018 and 2019, however, maintaining a similar revenue with a fall of 0.8% revenue between 2018 and 2019.

Table 11-7: South West Regional Performance (Tourists in 2018)

Region		Britain	Mainland Europe	North America	Other Areas	All Overseas	Northern Ireland	Domestic Trips
South West ³	Tourists (000s)	616	924	803	169	2,512	72	2,401
South West	Tourist Revenue (€mn)	179	347	384	77	987	48	474

Table 11-8: South West Regional Performance (Tourists in 2019)

Region		Britain	Mainland Europe	North America	Other Areas	All Overseas	Northern Ireland	Domestic Trips
South West	Tourists (000s)	541	877	751	166	2,335	38	2,316
South West	Tourist Revenue (€mn)	166	371	335	98	970	25	511

Tourism is considered an important industry for County Cork. Chapter 8: Tourism, of the Cork County Development Plan (2014), identifies that:

‘Tourism in County Cork is based on its rich natural and built heritage. The principal features of the area’s tourism product include; mountains and upland habitats; rivers and lakes, over 1100 km’s of scenic rugged coastline and peninsulas with long stretches of sandy beaches, fertile agricultural land and many upland peatlands and forest/woodland areas. These natural assets combined with a rich heritage of archaeological and historical sites, built environment including manor homes and gardens, attractive towns and villages offer a unique tourism product. [Section 8.1.11: Tourism Product in County Cork].

Top attractions in the Cork area in 2019, listed by Fáilte Ireland, include Blarney Castle, Doneraile Park and Fota Wildlife Park, which are 24km, 30km and 42km from the proposed wind farm site, respectively. Other recreation and tourism amenities located in the area of the proposed wind farm include:

- Duhallow Way, within the wind farm site area.
- Carrigagulla Stone Circle, ca. 200m from the wind farm site.
- St. John’s Well, ca. 2km from the wind farm site.
- Ballinagree Park & Playground, ca. 2km from the wind farm site.

³ County Cork and County Kerry



- Loughatooma Walking Trail, ca. 2km from the wind farm site.
- Toureen Mountains Walking Trail, ca. 3km from the wind farm site.
- Kocknakilla Stone Circle, ca. 5km from the wind farm site.
- Banteer Schooling Track (Dog Track), ca. 6km from the wind farm site.
- Aghinagh GAA Club, ca. 6km from the wind farm site and ca. 500m from Clashavoon Substation.
- Boolymore Wood, ca. 8km from the wind farm site.
- Millstreet Town Park and Playground, ca. 9km from the wind farm site.
- Millstreet GAA Club, ca. 9km from the wind farm site.
- Green Glens Arena (Millstreet), ca. 9km from the wind farm site.
- Stukeen Mountain Forest Recreation Area, ca. 9km from wind farm site.
- Bweengduff Mountain Forest Recreation Area, ca. 9km from wind farm site.
- Mullinhassig Wood & Waterfalls, ca. 10km from the wind farm site and ca. 6km from Clashavoon Substation.
- Claragh Mountain, ca. 10km from the wind farm site.
- Coomeenatrush Lake & Waterfall, ca. 10km from the wind farm site.
- Mount Hillary, ca. 10km from the wind farm site.
- Drishane Castle, ca. 10km from the wind farm site and in proximity to the TDR.
- Sli Gaeltacht Mhuscraí Trail, ca. 11km from the wind farm site.
- Macroom Golf Club, ca. 11km from the wind farm site.
- Tubrid Well, Millstreet, ca. 11km from the wind farm site.
- River Lee, ca. 12km from the wind farm site.
- Carrigaphooca Castle, ca. 12km from the wind farm site.

Overall, the most significant recreation activity/attractions at the proposed Ballinagree Wind Farm site is trail walking and hiking. Some of the existing archaeological sites can be accessed from existing forestry trails and public roads. Through public consultation, angling was also found to be a popular recreation activity in the greater area with a local angling club established in nearby Macroom.

The Duhallow Way is a ca. 67km national waymarked trail which passes through areas of Counties Cork and Kerry. It forms a part of the European walking route E8 which links a number of Irish walking routes together to form a section of the European route. A section of the route passes through the proposed Ballinagree Wind Farm along the L2758 Butter Road, before entering Coillte lands in a northerly direction where it shares a section of track with the proposed wind farm. The Duhallow Way is illustrated in Figure 11-5 in the context of the proposed wind farm.

Millstreet Country Park is located 2km west of the proposed wind farm site, however, this park has been closed to the public since 2017.

As described in Chapter 14: Archaeology, Architectural and Cultural Heritage, there are 14 no. known archaeological sites in close proximity to the wind farm site and 5 no. national monuments located within approximately 12km from the proposed wind farm.



Community Facilities

Community facilities in proximity to the proposed Wind Farm Site are centred on towns and villages in the area. The closest settlement to the site is Ballinagree, located ca. 2km south of the proposed wind farm. This small village has facilities including a Church, National School and Playground. Lyre Village, located ca. 6km north east of the wind farm site has facilities including a Church and National School. Rylane, a small village ca. 6km south east of the wind farm site has facilities including a post office, community park, national school, church and health centre.

The most proximate town to the wind farm site is Millstreet, ca. 9km north west. The TDR passes through the eastern section of the town. Community facilities within the town include medical centre, medical practice, community school, national school and pre-school, church, playground, town park, post office, garda station and various town centre shops and services.

The proposed grid route does not pass by any significant community facilities. Community facilities in proximity to the point of connection to the national grid at the existing Clashavoon Substation include a national school, church and sports ground within 1km of the substation.

11.6.2 Potential Impacts – Recreation, Amenity and Tourism - Construction

There are no significant tourism attractions located in proximity to the proposed Ballinagree Wind Farm site, grid route and TDR, and as such, the construction phase of the proposed development is not expected to impact on major tourism attractions, tourism numbers or tourism revenue.

During the construction phase of the proposed Ballinagree Wind Farm, construction works have potential to cause impacts on recreation, amenity and tourism activities and features within the vicinity of the wind farm site. This is likely to occur in close proximity to the construction site and has potential to impact on the existing Duhallow Way which passes through the site at the north eastern section, as illustrated in Figure 11-5.

Approximately 1km of the Duhallow way will be utilised for access and construction activities during the construction phase of the proposed development. This section of the Duhallow Way will be closed to the public during the construction phase which is estimated to last between 18 and 24 months. Furthermore, noise, traffic and dust have potential to cause nuisance along the on-road area (L2758 Butter Road) of the Duhallow Way which comes in proximity to the proposed wind farm site. This is likely to have a short-term moderate, negative impact on the amenity of this section of walking trail if unmitigated.

Sections of forestry located at the south and north east of the wind farm site which are usually subject to Coillte's open forestry policy will be closed to the public during the construction phase. This is likely to have a short-term slight, negative impact on recreational use of the site, however, this is necessary to maintain public safety. Furthermore, access to archaeological sites within or in close proximity to the wind farm site may be limited in the short-term due to construction activities, however, due to a distance of at least 100m between archaeological sites and proposed infrastructure, no direct or indirect impacts on the immediate setting of the known archaeological resource are predicted during the construction phase, as set out in Chapter 14.

Potential impact to angling activities could occur downstream of the site as a result of deterioration of water quality, in a worst case scenario where exposed soil, silt-laden run-off or petrochemicals enter a stream at the wind farm site or along the grid route as a result of construction activity. Mitigation has been set out in Chapter 8: Biodiversity, Chapter 9: Land, Soils and Geology and Chapter 10: Hydrology & Water Quality to avoid impact on the water quality of streams during the construction phase. As a result, the construction stage is unlikely to impact negatively on angling activities in the greater area.



There are no significant tourist or recreation facilities located along the proposed grid route. A church, national school and GAA grounds are located within 1km of the Clashavoon Substation at Rusheen. It is unlikely that the proposed construction works at the Clashavoon Substation will impact on the amenity of these facilities due to their distance and temporary nature.

The proposed haul route and TDR pass through the eastern area of the town of Millstreet. The increased traffic through this area may have an impact on town centre services. Furthermore, the temporary removal of street furniture, street lighting, telecommunication and electricity wires along the TDR during turbine delivery may result in a brief negative impact on town centre services. However, due to the brief nature of these works, potential impact is expected to be imperceptible.

11.6.3 Potential Impacts – Recreation, Amenity and Tourism - Operation

In relation to tourism and wind energy development, the Wind Energy Development Guidelines for Planning Authorities (2006) states the following:

“Wind Energy developments are not incompatible with tourism and leisure interests, but care needs to be taken to ensure that insensitively sited wind energy developments do not impact negatively on tourism potential. The results of survey work indicate that tourism and wind energy can co-exist happily”

The Draft Revised Wind Energy Development Guidelines (2019) also maintain that wind energy development “can co-exist happily” with tourism and go on to detail the survey works as also cited in the 2006 guidelines.

The survey work referred to in the guidelines is Sustainable Energy Ireland’s (SEI’s) Attitudes towards the Development of Wind Farms in Ireland (2003). The SEI (now SEAI) report found that the overall attitude towards wind farms is positive.

“The overall attitude to wind farms is very positive, with 84% of respondents rating it positively or very positively (Chart 2.6). Only 1% rate it negatively (‘fairly bad’), with 14% not having an opinion either way, and no one rating wind farms ‘very negatively’. Interestingly, this time it is those from Dublin who are most positively disposed; this could arise from the fact that Dubliners are less likely than others to have a wind farm built in their locality.”

Where negative attitudes were voiced towards wind farms, the visual impact of the turbines on the landscape was the strongest influence. The report also notes however that the findings obtained within wind farm catchment areas showed that impact on the landscape is not a major concern for those living near an existing wind farm (SEI, 2003).

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

“Over 8 in 10 recognise wind as a non-polluting source of energy, while a similar number believe it can make a significant contribution to Ireland’s energy requirements. People therefore seem to have little difficulty with the concept of wind energy”.



This report concludes that based on the detailed study of attitudes, it is clear that there is “widespread goodwill towards wind farm developments”.

Recent independent research conducted by BiGGAR Economics in 2016 entitled ‘Wind Farms and Tourism Trends in Scotland’, assessed the relationship between wind farm developments and the tourist industry in Scotland. An analysis was carried out on eight local authorities which had witnessed a higher increase in wind energy developments than the Scottish average. Of the eight local authorities, five also witnessed a greater increase in sustainable tourism employment than that of the National Average with just three witnessing less growth than the Scottish average. The research concluded that at local authority level, no detrimental impact occurred on the tourism sector as a result of wind energy development, rather that, in the majority of cases, sustainable tourism employment performed better than other areas.

Fáilte Ireland conducted research titled “Visitor Attitudes on the Environment”, which was first published in 2008 and updated in 2012. The research surveyed both domestic (25%) and overseas (75%) holidaymakers to Ireland to determine their attitudes to wind farms. The survey results indicate the following:

- Most visitors are broadly positive towards the idea of building more wind farms on the island of Ireland. A minority (one in seven) were negative towards wind farms in any context.
- Despite the fact that almost half of the tourists interviewed had seen at least one wind farm on their holiday, most felt that their presence did not detract from the quality of their sightseeing.
- The largest proportion (45%) said that the presence of the wind farm had a positive impact on their enjoyment of sightseeing, with 15% claiming that they had a negative impact.
- Almost three quarters of respondents claimed that potentially greater numbers of wind farms would either have no impact on their likelihood to visit or would have a positive impact on future visits to the island of Ireland.

The updated survey, 2012, found that over half of tourists surveyed had seen a wind turbine while travelling the country. The survey results were as follows:

- 32% said that the wind turbines enhanced the surrounding landscape.
- 47% said that it made no difference to the landscape.
- 21% claimed wind turbines had a negative impact on the landscape.
- 71% of respondents claimed that potentially greater numbers of wind farms would either have no impact on their likelihood to visit or have a positive impact on future visits to the island of Ireland.

In 2011, Fáilte Ireland’s guidelines on tourism and environmental impacts stated in Chapter 4 titled ‘Project factors affecting tourism’ that ‘some types of new or improved large scale infrastructure – such as roads – can improve the visitor experience – by increasing safety and comfort or can convey a sense of environmental responsibility – such as wind turbines.’

Further research has been undertaken in Scotland in 2011 by Visit Scotland who have produced a Wind Farm Consumer Research report which showed that 83% of those surveyed said a wind farm would not affect their decision about where to stay when on a holiday or short break in Scotland. Also, against a backdrop of increased wind farm deployment, Visit Scotland’s statistics showed the number of visits to Scotland last year and the amount of spending by visitors both increased while their ‘Scotland National Visitor Survey 2011’ made no mention of the issue of wind farms affecting tourism in Scotland.



From a review of literature as detailed above, it is concluded that the majority of tourists surveyed had a generally positive view on wind energy development in the landscape. Further analysis of the potential visual impact of the proposed Ballinagree Wind Farm is described in Chapter 15 – Landscape and Visual.

The most proximate major tourist attraction is Blarney Castle, located ca. 24km from the wind farm site. As detailed in Chapter 15: Landscape & Visual, an assessment of the potential for turbine visibility from Blarney Castle was conducted. Whilst there is some potential for distant brief glimpses of the proposed development from the upper levels of the Castle, this will be barely discernible from this distance of c. 24km to the nearest turbine. Considering the distance between the proposed development and major tourism attractions of the region and the tourism attitudes survey as detailed above, it is considered that the Ballinagree Wind Farm will have a long-term and non-significant to imperceptible impact on tourism potential of the greater Cork Area.

The Duhallow Way National Waymarked Trail will be open to the public during the operational phase of the proposed development. As detailed in Chapter 15: Landscape & Visual, whilst the proposed turbines will have a dominant visual presence along sections of this waymarked trail, they will not obstruct views afforded of neighbouring ridges or distant mountains. Views of turbines at a near distance are also commonplace along sections of the Duhallow Way in the Boggeragh Mountains, and therefore the proposed project will not appear as an incompatible feature in the landscape.

The proposed development will include approximately 15km of upgraded or new access tracks which will be developed as walking trail routes throughout the wind farm site. This will include links to the existing sections of the Duhallow Way as well as providing users with a new section of trail to a viewing platform from the Duhallow Way. Furthermore, it is proposed to connect these trails to existing archaeological features throughout the site and supply archaeological and biodiversity heritage information boards, trail waymarks, trail viewing points and a trailhead carpark and picnic area. It is proposed to partially reinstate the southern construction compound for use as a trail head car park with up to 40 no. parking spaces for visitors. This enhancement of the walking and hiking infrastructure and the connection to heritage features throughout the site will result in a permanent moderate, positive impact to the existing recreation offering of the area and will have a permanent slight, positive impact on the Duhallow Way. The proposed amenity trail is illustrated in Figure 11-5.

The proposed development will be visible from Mount Hillary Looped Walk to the north of the site.. As detailed in Chapter 15: Landscape & Visual, this is a broad sweeping panorama that affords a view across much of the Boggeragh Mountains where existing wind energy developments are perceived as one of the more common upland land uses. The northern cluster of proposed turbines appear evenly spaced and in a legible manner, albeit they will generate some sense of visual clutter in combination with the existing Boggeragh and Carrigannon turbines. Nonetheless, the proposed turbines will be distant background features and the significance of visual impact is considered to be ‘Moderate-slight’. With respect to tourism and recreation, this is considered to have a long-term non-significant, neutral impact on the amenity of the Mount Hillary Looped Walk due to the distance (10km) and presence of existing wind farms between the proposed development and the looped walk.

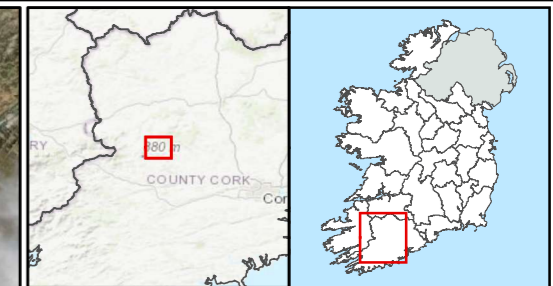
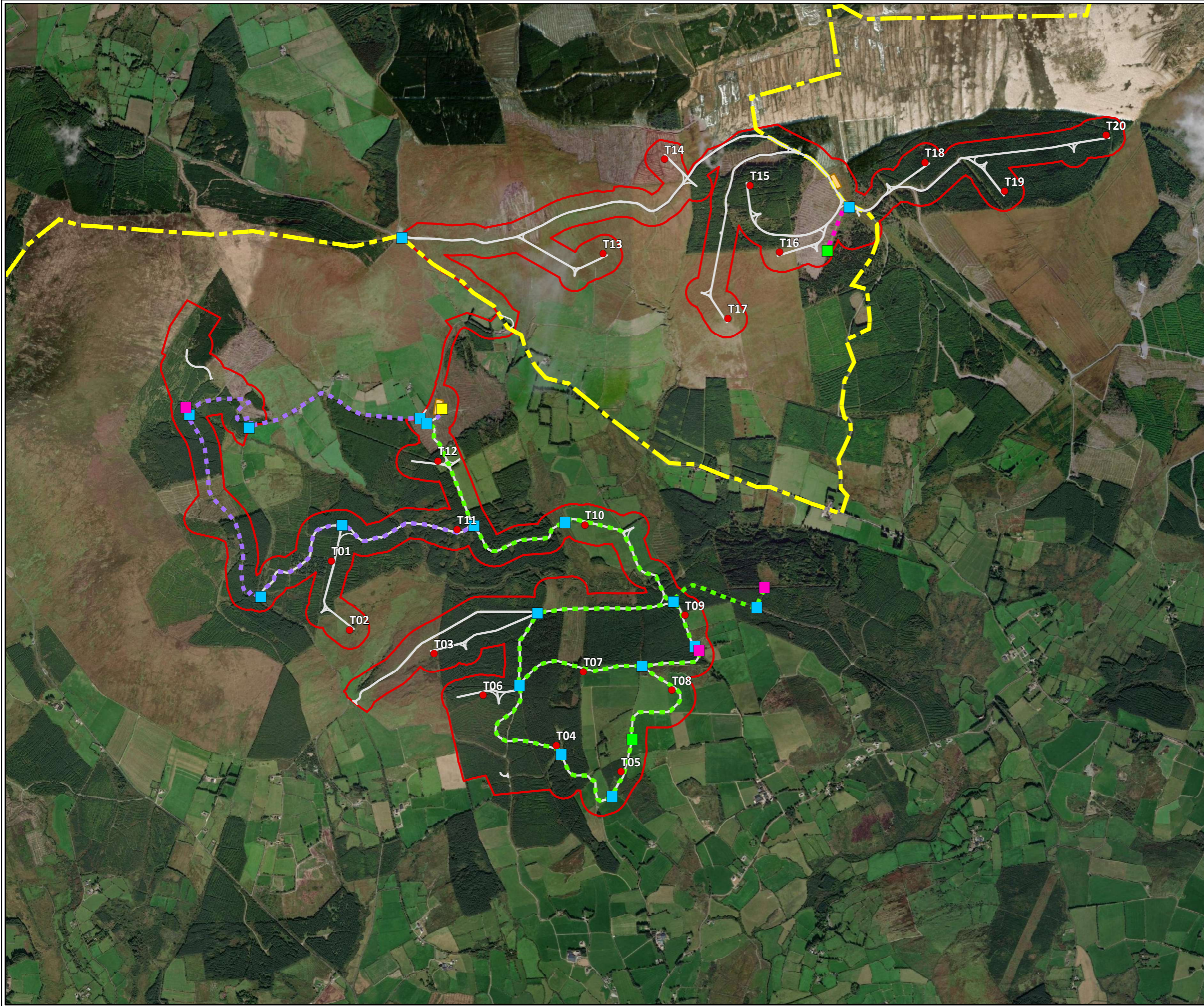
In relation to community facilities, the village of Ballinagree is the most proximate settlement to the proposed wind farm. As detailed in Chapter 15: Landscape & Visual, a ‘moderate’ impact of significance is associated with the settlement of Ballinagree which has the potential for near distance views of some of the turbines within the southern cluster. This is not expected to negatively impact on the amenity of the community facilities in the village. If consented, a community benefit fund will be associated with the project, as detailed in section 11.4.3.2. This will likely benefit the village of Ballinagree in its community facilities, recreation facilities and amenities, resulting in a long-term moderate, positive impact.



It is unlikely that works will be required on the TDR or grid route during the operational phase of the proposed development except for potential repair works to the grid connection or if large turbine components require replacement.

Overall, it is expected that the operational phase of the proposed development will have a long-term moderate, positive impact on recreation, amenity and tourism in the area by providing new and upgraded recreation trails at the site. Furthermore, this will contribute to Cork County Council Policy Objective GI 3-1 which aims to:

“Require new developments to contribute to the protection, management and enhancement of the existing green infrastructure of the County and the delivery of new green infrastructure, where appropriate.”



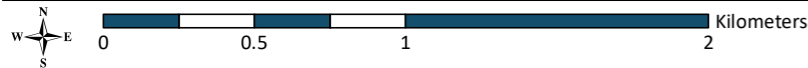
Legend

- Development Boundary
- Trail Head Car Park
- Proposed Turbine Layout
- Heritage Information Board
- Trail Viewing Point
- Trail Waymarker
- Trailhead carpark, picnic area and information
- Access Tracks
- Duhallow Way Walking Route

Trail Routes:

- Northern Trail
- Southern Loop
- Western Loop

TITLE:	Recreational Amenity Trails		
PROJECT:	Ballinagree Wind Farm		
FIGURE NO.:	11.5		
CLIENT:	Coillte and Ørsted		
SCALE:	1:25000	REVISION:	0
DATE:	07/12/2021	PAGE SIZE:	A3





11.6.4 Potential Impacts – Recreation, Amenity and Tourism - Decommissioning

The decommissioning phase of the proposed development is described in Section 3.8 of this EIA and provides for the removal of turbines and associated infrastructure from the site. The potential impacts associated with the decommissioning phase in relation to recreation, amenity and tourism will be similar to those associated with construction phase but will likely be of a reduced magnitude.

Decommissioning works will include removal of above ground structures including the turbines, mountings and fencing. During the works, forestry tracks and amenity trails in proximity to the site will be closed to the public to assure public safety. Similar to the construction phase, this is expected to have a short-term moderate, negative impact on recreational trail walking and hiking at the Ballinagree Wind Farm site.

Due to the temporary nature of the decommissioning phases of the Ballinagree Wind Farm, it is expected to have an insignificant and temporary impact on recreation, amenity and tourism.

11.6.5 Mitigation Measures – Recreation, Amenity and Tourism

Mitigation measures for recreation, amenity and tourism are primarily related to the preliminary design stage of the Ballinagree Wind Farm, which has allowed for the prevention of unnecessary or inappropriate development to occur that would significantly affect any recreational or tourist amenity. In designing the Ballinagree Wind Farm, careful consideration was given to the potential impact on landscape amenity. The magnitude of visual impact on the landscape is assessed in Chapter 15 – Landscape and Visual.

The most significant potential for tourism and recreation activity at the wind farm site and surrounding area was identified as trail walking and hiking. The development of the proposed Ballinagree Wind Farm has the potential to increase the amenity value of the area by improving recreation facilities, providing both new and improved trails in and around the site which can be used for walking and hiking. This provision is in keeping with the character of recreational activities popular in the area.

In providing for public safety, appropriate signage and safety measures will be put in place where forestry tracks will be closed to the public due to construction and decommissioning activities.

During the construction and decommissioning phases, a diversion will be put in place for the section of the Duhallow Way which passes through the wind farm site. This will direct walkers to an alternative route adjacent existing access tracks in order for walkers to bypass the construction activity. Appropriate signage will be put in place to direct walkers. Notification of this diversion will be provided to Sport Ireland, Failte Ireland and Cork County Council in order to provide online information for walkers and hikers in advance of their recreation activity.

Chapter 13: Traffic and Transportation sets out mitigation measures for potential effects associated with increased traffic volumes of the construction and decommissioning phases of the proposed development which may have an indirect impact on recreation and amenity in the area of the wind farm site.

11.6.6 Residual Impacts – Recreation, Amenity and Tourism

There is potential for a temporary to short-term slight, negative impact to recreation, amenity and tourism due to the closure of existing forestry tracks and closure of a ca. 1km section of the Duhallow Way for a period of 18 to 24 months during the construction phase, and up to 6-months during decommissioning phases of the proposed development.



However, there are no expected significant, adverse impacts to recreation, amenity and tourism in the surrounding area as a result of the development of the proposed Ballinagree Wind Farm due to the distance from major tourism attractions and the short-term/temporary nature of the works.

A residual permanent significant, positive impact on recreation, amenity and tourism is expected as a result of the provision of new and improved recreation facilities at the site which are expected to remain after decommissioning of the wind farm development. Furthermore, the community benefits gained during the operational phase due to the capital investment in the area are expected to last beyond the decommissioning phase resulting in a residual permanent significant, positive impact on the amenities of the area.

11.7 Human Health & Safety

This section provides a comprehensive overview of the health profile of the receiving environment and the State, in order to provide for the assessment of potential impacts that the proposed development may have on human health. An assessment of peer reviewed literature has been carried out to provide a sound, scientific basis for the potential impacts arising from the proposed Ballinagree Wind Farm.

11.7.1 Existing Environment – Human Health & Safety

Human health in relation to this assessment refers to the nature and possibility for adverse health effects on humans. In the context of existing human health, The Department of Health (2016) has published a report entitled ‘Health in Ireland, Key Trends 2019’ which provides statistics relating to human health in Ireland over the last 10 years (2009 to 2019). Generally speaking, Ireland’s population has a high level of good health as demonstrated in self-evaluation statistics included in Census data (see Table 11.9 below).

From analysis of the health statistics below, the general health of the Main Wind Farm Site, TDR and Grid Connection is recorded as very good or good. This is in line with State and County-wide averages. The Main Wind Farm Site, Grid Connection and TDR have approximately the same averages, with 90% of respondents of the 2016 Census indicating that their health was ‘good’ or ‘very good’ and 1% indicating their health was ‘bad’. Less than 0.5% of respondents indicated their health was ‘very bad’ for these areas. This shows a slight greater percentage of persons with ‘good’ or ‘very good’ general health when compared to the State and County-wide averages which are both 88%.

The TDR has slightly lower averages of respondents in ‘very good health’ with 7% less than the Main Wind Farm Site and 8% less than the Grid Connection, but overall, the averages for the TDR are similar to that of the County and State. Overall, the Census data indicates that the population of the Main Wind Farm Site, TDR and Grid Connection are generally in good health.

Table 11-9: Population by General Health (Census, 2016)

General Health (Census 2016)	State	County Cork	Main Wind Farm Site	TDR	Grid Connection
Very Good	59%	61%	67%	60%	68%
Good	29%	27%	23%	30%	22%
Fair	8%	8%	6%	7%	5%



Bad	1%	1%	1%	1%	1%
Very Bad	0%	0%	0%	0%	0%
Not Stated	3%	3%	3%	2%	4%

With respect to health and safety, the Health and Safety Authority of Ireland monitor fatal workplace injuries throughout Ireland. In relation to construction activities, in the past 10 years (2011 to 2020) an average of 8.9 fatal workplace injuries have occurred throughout Ireland per annum. This is above average in relation to other economic sectors. The average number of fatal workplace injuries throughout all economic sectors for the past 10 years in Ireland has been 2.4 fatal workplace injuries per year. This indicates the above average danger levels which workers are exposed to on construction sites when compared to other economic sectors.

With regard to the control of major accident hazards involving dangerous substances, on examination of upper and lower tier Seveso Establishments in the surrounding region of the proposed development, no Seveso Establishments were identified in proximity to the site. The closest Seveso site is located approx. 20km north east at the LP Gas Filling Services lower tier Seveso Site, south of Mallow town.

According to Geological Survey Ireland’s datasets, there has been no landslide events in the area of the proposed wind farm. The most proximate recorded landslide event occurred approx. 15km west in the Derrynasaggart Mountains, County Kerry. According to the OPW (floodinfo.ie), no major flood incidents are recorded in proximity to the proposed Wind Farm Site or Grid Route. A minor flood event was recorded in 2005 adjacent the site on the L2758 Butter Road. The event is described as:

“Annagannihy North to Mushera Road flooding as a result of runoff in periods of heavy rain from steep ground. – recurring”

There are no previously recorded flood events along the grid route. Flood events have been recorded along or adjacent to sections of the TDR, however, no flood events have been recorded at the TDR node upgrades where works are required.

There is no record of wildfires at the proposed Wind Farm Site, Grid Route or TDR.

11.7.2 Potential Impacts – Human Health & Safety - Construction

The construction phase of the proposed development has potential to create health and safety hazards for both construction workers and the general public. This is as a result of construction activities and the associated impacts including increased traffic, transport of heavy or bulky materials, noise emissions, dust emissions, construction activities on public roads, excavation and general site-safety.

Aspects of the construction works that may present health and safety issues, are as follows:

- General construction site safety (e.g., slip/trip, moving vehicles etc.);
- Lifting of heavy loads overhead using cranes;
- Working at heights;
- Working in confined spaces;
- Ground conditions and soil stability;



- Road safety due to increased traffic numbers and transport of oversized loads to the site along turbine delivery routes and proposed haul routes;
- Pedestrian and recreation user safety;
- Installation of electrical cables on-site and in the public road corridor;
- Potential emissions impacting air quality and noise;
- Substation construction involving high voltage electricity;
- Working with electricity during commissioning.

The works proposed as part of the Ballinagree Wind Farm will pose a risk to construction workers on-site especially during adverse weather conditions. This has potential to cause significant impact on human health in the short term during the 18-24 month construction period throughout the construction site, if proper construction and safety protocols are not followed.

At the time of preparation of this chapter, the COVID-19 virus represents a significant risk to human health. Similar to any construction site, potential for spread of the virus during the construction phase of the proposed development may occur due to potential transmission from worker to worker due to construction activities and potential for close quarter working conditions. Up to date HSE guidance will be consulted regularly in line with HSA recommendations and all reasonable on-site and travel precautions will be taken if COVID-19 remains a significant health issue during the construction phase.

Potential health and safety hazards may occur on public roads and adjacent land uses including agricultural lands and forestry lands and associated recreation uses, including forestry tracks and the Duhallow Way National Waymarked Trail. As detailed in section 11.6.1, the proposed wind farm site and adjacent lands is used for recreation activity. A key risk to public safety associated with the construction of the proposed development involves the potential for recreation users accidentally entering the wind farm construction site. If unmitigated, this has potential for temporary significant negative impact on human safety throughout the 18-24 month construction phase in proximity to the construction site. To mitigate against this, the wind farm site and associated walking trails will be closed to the public during the construction phase, as detailed in Section 11.7.5. Furthermore, potential impact to public safety may occur as a result of the closure of forestry tracks used for recreation activity which may cause confusion or disorientation for recreation users.

Construction and accommodating works taking place on the public road and the delivery of heavy/bulky goods (TDR) and machinery on narrow roads may lead to temporary limited access to farmlands, forestry lands and residential properties creating a potential hazard. This may cause a potential temporary moderate, negative impact to public safety along the TDR route and grid route during the construction phase.

The delivery of turbines will require transport of heavy/bulk goods from Foynes Port in County Limerick via the N69, N18, M20, N20, N72, R583 before entering the L1123 local road on approach to the proposed wind farm site. Due to the abnormality of the turbine components, there is potential human safety risks associated with their delivery including traffic safety and pedestrian safety at special manoeuvring points. This has potential for temporary significant, negative impacts to human safety during the delivery of turbine components if unmitigated.



Potential impacts on air quality has the potential to affect human health. This has been assessed in Chapter 6: Air and Climate Change. No significant impacts on air quality have been identified with regard to the emissions of construction related traffic. The impact on air quality due to emissions from construction works (construction machinery) has been identified as imperceptible. Due to the distance between the nearest receptor and source of emissions at the wind farm site, the temporary negative impact on air quality at nearby dwellings will be imperceptible.

Construction works associated with the grid connection have potential to impact on nearby dwellings with regard to air quality. Due to the nature of construction along the proposed grid route, which works as a “rolling” construction site, meaning that these works will not be concentrated in any one area of the route, these effects are considered to be brief to temporary slight, negative. Therefore, the construction phase of the Ballinagree Wind Farm will not have a significant impact on air quality.

The potential impacts from noise during the construction phase at the Wind Farm site and TDR is expected to have a temporary slight, negative impact on nearby residential receptors. The works will remain below the construction noise limit of 65dB as detailed in Chapter 7: Noise and Vibration. Vibration is not expected to be perceived at nearby residences. Impacts from noise along the grid route during the construction phase has potential to cause temporary significant, negative impact at nearby dwellings, however, given the nature of the grid connection works, construction activities will not occur over an extended period at any one location.

Potential impacts on human health associated with land, soils and geology during the construction phase relate to potential contamination of ground water which can be caused by hydrocarbon spills, siltation and landslide. Furthermore, landslides have the potential to cause injury and fatality. A slope stability assessment has been carried out and slopes have been considered stable in the long-term drained conditions at the wind farm site. Considering the mitigation measures as set out in Chapter 9: Land, Soils and Geology, the impact on human health during construction works over an 18 to 24 month period is expected to be temporary, negligible and imperceptible.

Potential impacts on human health associated with hydrology during the construction period relate to standing water caused by blocked drains, water collecting in excavated areas or diverted water resting in an undrained area. This has potential to cause drowning with particular risk to on-site staff. There is also potential for blockage of roadside drains causing potential hazard to traffic. A flood risk assessment has been carried out and a drainage design has been incorporated into the proposed development as detailed in Chapter 10: Hydrology and Water Quality. As a result, the proposed development is expected to have a negligible impact on flood risk in the surrounding area of the wind farm site or along the grid route and TDR. The increased surface water runoff due to development is not significant and these flows are further reduced with the proposed drainage system. The likely impact of flooding on human health and safety as a result of construction activities is therefore temporary and imperceptible.

Overall, if unmitigated, the construction phase of the proposed development has potential for temporary significant, negative impact to human health and safety for construction workers and members of the public in proximity to the site, if proper construction safety protocols and traffic management are not applied. Mitigation measures to prevent potential impact to human health and safety are set out in section 11.7.5. Once mitigation is put in place, impacts to human health and safety during the 18-24 month construction period are unlikely.



11.7.3 Potential Impacts – Human Health - Operation

11.7.3.1 *Site access and usability of lands*

During the operation phase of the proposed development, there is potential for impact to human health and safety if appropriate mitigation measures are not put in place.

Potential human safety issues can occur due to the falling ice as a result of the icing of turbine blades in cold weather conditions. This is unlikely to present safety problems as wind turbines are fitted with anti-vibration sensors. These sensors detect any imbalance caused by the icing of the blades. The sensors will cause the turbine to shut down until the blades are de-iced prior to beginning operation again.

Potential impacts to the safety of operation and maintenance staff are associated with working at heights, working at steep gradients or uneven ground, moving vehicles and machinery and working with high-voltage electricity. Properly qualified staff will be employed at the wind farm site and safety protocol will be followed at all times. Therefore, impact to the safety of operation and maintenance staff is unlikely.

Under normal conditions, operational wind turbines do not pose a threat to public safety or the safety of animals. Section 5.7 of the Wind Energy Development Guidelines (2006) states the following:

“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. There is a very remote possibility of injury to people or animals from flying fragments of ice or from a damaged blade.”

Throughout the operational phase of the proposed development, trails within Coillte lands and new proposed trails will be open for recreational walking and hiking. Many of these tracks will be upgraded during the construction phase improving amenity for walkers. The trails will not come in proximity to electrical infrastructure. The off-road trails will provide a safe area for children and adults to exercise in the countryside. No likely significant negative impacts to public safety will occur due to the use of the proposed new and upgraded recreation trails.

The use of the proposed new and upgraded recreation trails will provide opportunities for health gain through encouragement of exercise. This has potential to provide a long-term moderate, positive impact to human health in the locality.

There are no expected works to take place along the grid route or TDR during the operational phase of the proposed development. If maintenance works are required in these areas or bulk equipment is required to be delivered, proper safety protocols will be put in place in line with the mitigation measures set out in section 11.7.5. Therefore, impact to human safety on public roads during the operation phase is unlikely.

11.7.3.2 *Health and Safety Standards and Procedures*

As part of the human health assessment of the proposed Ballinagree Wind Farm, an analysis of peer-reviewed literature on potential health impacts arising from wind energy projects was undertaken. Anecdotal reports were identified of negative health impacts in people living in close proximity to wind turbines, however, the literature review demonstrates that peer-reviewed research generally does not support these statements.



The review of literature did not find any published, credible scientific sources that link wind turbines to adverse health effects. The key documents that have been taken into consideration with respect of potential effects on human health are as follows:

- ‘Wind Turbine Sound and Health Effects - An Expert Panel Review’, American Wind Energy Association and Canadian Wind Energy Association, December, 2009.
- ‘Wind Turbine Syndrome – An independent review of the state of knowledge about the alleged health condition’, Expert Panel on behalf of Renewable UK, July 2010.
- ‘A Rapid Review of the Evidence’, Australian Government National Health and Medical Research Council (NHMRC) Wind Turbines & Health, July 2010.
- ‘Position Statement on Health and Wind Turbines’, Climate and Health Alliance, February 2012.
- ‘Wind Turbine Health Impact Study - Report of Independent Expert Panel’ – Massachusetts Departments of Environmental Protection and Public Health, 2012.
- ‘Wind Turbines and Health, A Critical Review of the Scientific Literature Massachusetts Institute of Technology’, Journal of Occupational and Environmental Medicine, Vol. 56, Number 11, November 2014.
- ‘Wind Turbine Noise and Health Study’, Health Canada, 2014.
- ‘Wind Turbines and Human Health’, Front Public Health, 2014
- ‘Position paper on wind turbines and public health’, Health Service Executive, February 2017
- ‘Environmental Noise Guidelines for the European Region’, World Health Organisation, 2018

‘Infrasound’ has been cited as a cause of potential health impacts as a result of wind turbine development. This is discussed in detail in Chapter 7: Noise and Vibration, Section 7.2.3. It states that infrasound is noise occurring at frequencies below that at which sound is normally audible, that is, less than about 20 Hz, due to the significantly reduced sensitivity of the ear at such frequencies. In this frequency range, for sound to be perceptible, it must be at very high amplitude, and it is generally considered that when such sounds are perceptible then they can cause considerable annoyance. However, wind turbines do not produce infrasound at amplitudes capable of causing annoyance as outlined in the following paragraphs.

The UK Department of Trade and Industry study, ‘The Measurement of Low Frequency Noise at Three UK Windfarms’ (2006), concluded that:

“infrasound noise emissions from wind turbines are significantly below the recognised threshold of perception for acoustic energy within this frequency range. Even assuming that the most sensitive members of the population have a hearing threshold which is 12 dB lower than the median hearing threshold, measured infrasound levels are well below this criterion.”

It goes on to state that, based on information from the World Health Organisation, ‘there is no reliable evidence that infrasound below the hearing threshold produce physiological or psychological effects’ and that ‘it may therefore be concluded that infrasound associated with modern wind turbines is not a source which may be injurious to the health of a wind farm neighbour’.

In terms of perceived effects from shadow flicker and noise, a shadow flicker assessment has been conducted and is included in Chapter 12 of this EIA and a Noise assessment is included in Chapter 7.



In relation to shadow flicker, the developer commits to zero shadow flicker through the installation of shadow flicker monitoring and software management measures. In terms of noise, operational wind farm noise levels meet the derived night and daytime noise limits at all residential properties surrounding the proposed Ballinagree Wind Farm. However, for some receptors a new source of noise will be introduced into the soundscape and it is expected that there will be a slight to moderate significance of impact, with dwellings closest to the project with a long-term moderate significance of impact.

Following a review of literature regarding the potential impact of operational wind farms on human health, it is concluded that there is no scientific consensus to support an association between negative health impacts and responsible wind turbine development. The operational phase will therefore likely have a long-term, imperceptible, neutral impact on human health in proximity to the wind farm site.

With respect to safety, only trained and licenced employees will be permitted to access the turbines. Appropriate training will be provided for potential emergencies; therefore, the operational phase of the proposed development will have a negligible impact on public health and safety.

11.7.3.3 Potential Health and Safety Impacts from Proposed Cables and Electromagnetic Interference

Wind turbines, like all electrical equipment, produce electro-magnetic radiation. The provision of underground electricity cables similar to the proposed capacity is however commonplace throughout Ireland and the installation to the required specification does not give rise to health concerns. The following research outlines the potential for health impacts caused by electromagnetic interference.

The EirGrid document ‘EMF & You: Information about Electric & Magnetic Fields and the electricity transmission system in Ireland’ (EirGrid, 2014) provides information on studies which have been carried out on the health impact of electromagnetic fields (EMF). This report notes that since 1979, many scientific studies have been carried out on the possible effects of EMF on people. Agencies include the World Health Organisation (2006), the National Radiological Protection Board of Great Britain (2004), and the International Agency for Research on Cancer (IARC) (2002).

In 2009 the International Commission on Non-Ionising Radiation Protection (ICNIRP) issued guidelines for exposure for members of the public to DC magnetic fields. Other more recent reviews have been performed for the UK’s Health Protection Agency (2012) and the European Union’s Scientific Committee on Emerging and Newly Identified Health Risks (2015). The Eirgrid (2014) report notes that:

“These agencies concluded that exposure to only very strong DC magnetic fields can cause biological effects. The exposures required to produce such effects, however, are extraordinarily high relative to levels of DC magnetic fields produced by common sources.”

The Eirgrid (2014) report concludes that exposure to extremely low frequency (ELF)-EMF from power lines or other electrical sources is not a cause of any long-term adverse effects on human, plant, or animal health. A 2019 Eirgrid report titled ‘The Electricity Grid and Your Health’ states that:

“The consensus from health and regulatory authorities is that extremely low frequency EMFs do not present a health risk.”



To ensure such adverse effects do not occur, the WHO (World Health Organisation) monograph recommended that policy-makers establish guidelines for ELF-EMF exposure for both the general public and workers, and that the best source of guidance is the ICNIRP guidelines.

In 2010, ICNIRP issued updated guidelines, which reviewed the research since the 1998 report and replaced previous recommendations given by ICNIRP for this frequency range. The revised range is detailed in table 11.10. The underground cable to be installed complies with these ICNIRP guidelines.

ICNIRP Guidelines for limiting exposure to time varying electric and magnetic fields (1Hz–100kHz) Health Physics 99(6):818-836; 2010.

Magnetic flux densities for Alternating Current (AC) magnetic fields are reported using units of microtesla (μT) and electric fields in kilovolts per metre (kV/m). The ICNIRP guidelines formed the basis of the EU guidelines for human exposure to EMF (EU, 1999) and the EU Directive 2013/35/EU on the minimum health and safety requirements regarding the exposure of workers to the risks from EMFs.

Table 11-10: ICNIRP Guidelines

Exposure Characteristics	Electric Field Strength (kV/m)	Magnetic Flux Density (μT)
ICNIRP 2010 General Public Reference Level	5	100

The magnetic fields associated with underground cables decrease rapidly with distance. For underground cables, the fields decrease with the square of distance. The electric field emissions from underground cables are negligible as the ground absorbs the field.

As the proposed cable does not pass under housing, the exposure levels will be extremely low. Most homes have average magnetic field levels in the range 0.2 μT to greater than 0.4 μT . These magnetic fields are attributable to low voltage sources such as wiring, appliances, and distribution circuits (Mastanyi et al, 2007). In dwellings and other properties with electricity, the levels will not exceed the ICNIRP guidelines by a significant margin.

Based on the details of the proposed development, there will be no impact on residential properties at any distance from the proposed development as the ICNIRP guidelines are not exceeded at all relevant distances including directly above the cables. The magnetic field associated with an underground 110kV cable is 2.32 μT directly above ground and 0.15 μT at 10 meters from the cable (EirGrid, 2019), significantly below the ICNIRP Guidelines levels of 100 μT . The ESB state that exposure to electrical fields associated with underground cables are considered negligible (ESB, 2017).



The HSE, in their 2017 report ‘Position paper on wind turbines and public health’ state the following with regard to Electromagnetic radiation:

“There is no direct evidence from which to draw any conclusions on an association between electromagnetic radiation produced by wind farms and health effects. Extremely low-frequency electromagnetic radiation is the only potentially important electromagnetic emission from wind farms that might be relevant to health. Limited evidence suggests that the level of extremely low-frequency electromagnetic radiation close to wind farms is less than average levels measured inside and outside suburban homes.”

In the case of the proposed grid connection between the Ballinagree Wind Farm and the Clashavoon substation, the electric and magnetic fields expected to be associated with the operation of the proposed cable fully complies with the ICNIRP and EU guidelines on exposure of the general public to ELF EMF. Therefore, the potential impact to human health as a result of electromagnetic interference associated with the operational phase of the Ballinagree Wind Farm will be negligible and imperceptible.

EU Directive 2013/35/EU on the minimum health and safety requirements regarding the exposure of workers to the risks from EMFs was transposed into Irish law on 1st July 2016 by the Safety, Health and Welfare at Work (Electromagnetic Fields) Regulations 2016 (S.I. No. 337 of 2016). The regulations impose a number of duties on employers to maintain safety during work procedures. This includes the carrying out of risk assessment, avoiding and reducing risk, employee information, training and consultation and health surveillance where appropriate. The proposed development will comply with both EU and Irish law and will result in a negligible impact to human health on employees at the Ballinagree Wind Farm during the operational phase.

11.7.3.4 Vulnerability of the Project to Major accidents and Natural Disasters

EU Directive 2014/52/EU which amends Directive 2011/92/EU states the following in relation to vulnerability of a project to major accidents and natural disaster:

In order to ensure a high level of protection of the environment, precautionary actions need to be taken for certain projects which, because of their vulnerability to major accidents, and/or natural disasters (such as flooding, sea level rise, or earthquakes) are likely to have significant adverse effects on the environment.

For such projects, it is important to consider their vulnerability (exposure and resilience) to major accidents and/or disasters, the risk of those accidents and/or disasters occurring and the implications for the likelihood of significant adverse effects on the environment.

The following section considers the proposed project’s vulnerability to major accidents and natural disasters, potential adverse impacts on human health and the environment, the magnitude of potential impacts, the likelihood of potential impacts and considers the preparedness of the project in case of accident, disaster or emergency.

Should a major accident or natural disaster occur, the potential sources of pollution onsite during the construction and operational phases of the Ballinagree Wind Farm are limited. The primary sources with the potential to cause significant environmental pollution and associated negative impacts on human health and the environment include the bulk storage of hydrocarbons, chemicals and wastes. In the case of the proposed Ballinagree Wind Farm development site, the storage of chemicals of this kind are strictly limited.



There is limited potential for significant natural disasters to occur at the Ballinagree Wind Farm as Ireland does not suffer from extreme temperatures like that of many countries at a similar latitude due to the dominant influence of the Gulf Stream. This provides Ireland with a mild temperate climate. Potential natural disasters that may occur are therefore limited to:

- Flooding;
- Fire;
- Major incidents involving dangerous substances;
- Catastrophic events; and
- Landslides.

Flooding

In the event of extreme weather conditions there is potential for the proposed development to negatively impact on human health and safety and the surrounding environment due to increased surface water runoff as a result of additional impermeable surfaces such as wind turbine hardstands and new access tracks. This has potential to add to flood risk which may negatively impact on human safety (including traffic), water quality, biodiversity, soil stability, material assets and archaeological or architectural heritage. It is unlikely that potential increase in flood risk will impact on noise and vibration, air and climate, landscape and visual and telecommunication and aviation. The magnitude of these consequences has potential to be significant, resulting in potential injury or fatality, property damage, infrastructure damage and damage to ecosystems.

The risk of flooding is addressed in Chapter 10: Hydrology and Water Quality, which concludes that the wind farm site is unlikely to be susceptible to flooding and will have a negligible impact on flood risk in the surrounding area, as a result of the proposed development. Furthermore, there is no expected increase to flood risk along the grid route or TDR.

In the event of extreme weather conditions, the proposed surface water drainage will manage storm water avoiding significant negative impact on the project's infrastructure. Therefore, the proposed development will not likely result in increased flood risk, which will not likely result in effects on human safety (including traffic), water quality, biodiversity, soil stability, material assets and archaeological or architectural heritage, as the increased flood risk is considered negligible.

Mitigation measures are set out in Chapter 10: Hydrology and Water Quality to avoid potential negative impacts during the construction stage with respect to flood risk.

Fire

In respect of fire, in May 2017 a major gorse/ground vegetation fire incident took place in proximity to the 169MW Galway Wind Park. This incident highlights fire as a potential significant negative impact for the Ballinagree Wind Farm, in particular, given that a large area of the site is adjacent to forestry. It should be noted that a substantial number of wind farms are built within forestry in Ireland. In order to avoid negative impact from potential forest fires, an internal Coillte fire and security management plan is in place to control the potential spread of forest fires. This is achieved through the implementation of fire breaks within the lands and the training of staff in firefighting. Fire plans are reviewed and updated and provisions for firefighting are checked annually. The proposed infrastructure including turbines, met mast and substation are set back from the surrounding treelines in order to maintain a fire break.



In the event of electrical equipment catching fire at the proposed Ballinagree Wind Farm, there is potential for negative impact on human health and safety, air quality, water quality, biodiversity, soils, material assets, archaeological or architectural heritage and landscape and visuals. The magnitude of these consequences has potential to be significant and negative, resulting in potential injury or fatality, property damage, infrastructure damage, loss of forested lands and damage to ecosystems. It is unlikely that potential fire at the Ballinagree Wind Farm will have an effect on noise and vibration and telecommunication and aviation.

The potential for fire at the proposed Ballinagree Wind Farm is mitigated against by design. Furthermore, the wind farm will be remotely monitored, and potential accidents will be quickly identified and reported.

In line with WEI Health and Safety Guidelines for the Onshore Wind Industry (2011), Emergency Response Plans will include emergency response procedures for initial actions in the event of a fire. Records will be kept for testing of fire alarms and drills and maintenance/inspection of fixed and portable firefighting equipment. Information will be provided to employees on fire safety and fire prevention, including risks of and control measures to prevent fire outbreak, evacuation procedures and those responsible for their implementation, and the use of firefighting equipment, in line with HSA guidance.

During the construction phase of the proposed development, an emergency response plan will be in place as set out in Section 6 of the CEMP, included in Appendix 3.1 of Volume 3 of this EIAR.

Major Incidents Involving Dangerous Substances

Major industrial accidents involving dangerous substances pose a significant risk to human health and to the environment both on and off the site of an accident. The Health and Safety Authority (HSA) of Ireland list all upper and lower tier SEVESO establishments throughout Ireland. The proposed Ballinagree Wind Farm site is not in proximity to any site regulated under the Control of Major Accident Hazards Involving Dangerous Substances Regulations i.e. SEVESO site, that would fall within the consultation radius distance from a SEVESO site as per County Development Plan Policy Objective ZU 5-2. The most proximate SEVESO site located 20km north east of the proposed wind farm site at the Quartertown Industrial Estate, Mallow (LP Gas Filling Services lower tier Seveso Site).

Given the nature of the proposed development, coupled with the lack of proximity to established Seveso sites, there is a negligible potential risk of negative impact to the proposed development and its receiving environment, as set out throughout this EIAR, arising from the occurrence of such a potential accident.

Catastrophic Events

According to the Health and Safety Authority (HSA), operational wind farms are still considered a workplace (albeit not permanently occupied). All persons who have control to any extent over the wind-farm have duties to ensure, so far as reasonably practicable, that the wind-farm does not pose a risk to those working there or to anyone not employed there but who may be affected by activities on the wind-farm.

Each wind-turbine, incorporating the tower, blades, gearbox and ancillary equipment in the tower and nacelle are considered to be machines under the European Machinery Directive [2006/42/EC]. The duties on designers and manufacturers of machinery are set out in the Machinery Directive, which has been transposed into national law by the 2008 European Communities (Machinery) Regulations [S.I.No.407/2008]. All wind turbines will be CE marked, which is in effect, a mark of assurance that the wind-turbine complies with the essential health and safety requirements (EHSRs) of EU supply law.



In all cases, the manufacturer or the manufacturer's authorised representative must compile information in a technical file confirming how the machine complies with these requirements. The maintenance of turbines and ancillaries must only be carried out by competent, trained and qualified personnel. The system of work for operation and maintenance must be planned, organised, maintained and revised to ensure safety of personnel.

Potential catastrophic events associated with operational wind turbines include:

- Wind turbine toppling (due to foundation or tower failure);
- Wind turbine rotational failure in extreme wind conditions (due to control system or rotor break failure); and
- Fire.

The primary mitigation against a catastrophic event that may endanger the health and safety of the public has been implemented at design stage through adequate siting of wind turbines which provide sufficient set back distances from occupied buildings and other infrastructure to avoid the risk of negative impact in the event of wind turbine collapse.

The tip height for wind turbines at the Ballinagree Wind Farm will range between 179m and 185m. No wind turbine is located within 800m of a residential dwelling. No turbines have been located within 2 x tip height of the proposed on-site substations in accordance with EirGrid general functional specifications. A setback distance is applied between wind turbines and existing HV overhead lines.

Turbines have been sited with consideration for existing ground conditions to minimise the risk of turbine foundation failure, toppling and landslide. Intrusive site investigations have been carried out to confirm ground conditions at turbine locations as well as slope stability analysis for turbines located on sloped ground. Other design mitigation measures employed for the siting of wind turbines include the following:

- Areas mapped by GSI as having a high susceptibility to landslides have been avoided;
- Turbine locations have been assessed by site investigation and visually by geotechnical engineers prior to confirmation of final siting;
- If turbines are located on sloped ground, particular care has been taken in design of road and hard standing alignments, cutting and filling and drainage;
- Peat probing has been carried out at turbine locations. Locating turbines in peat has been carried out in accordance with best practice guidelines and standards as set out in Chapter 9 Land, Soil, Hydrogeology & Geology.

Wind turbines are fitted with sophisticated remote monitoring and control systems to manage rotational speed. Turbines also have the capability to shut down in storm conditions through adjustment of blade pitch. Turbines are also fitted with emergency power supply (EPS) units to provide backup power in the event of a loss of mains power supply that could impact the control system.

Wind turbines shall be fitted with fire suppression systems and will have emergency escape procedures in place for operational staff in the event of fire in a wind turbine. An emergency response plan is contained in the CEMP included in Appendix 3.1 of Volume 3 of this EIAR.



Landslides

Landslides pose a risk to a range of environmental receptors including human safety (including traffic), hydrology and water quality, biodiversity, land, soil, geology and hydrogeology, material assets and archaeological and cultural heritage. The negative impacts associated with landslides can have a significant to profound effect on environmental sensitivities, depending on the scale of the landslide and the receiving environment.

As detailed in Chapter 9: Land, Soils and Geology, a slope stability assessment was carried out at the Ballinagree Wind Farm site to investigate the lands for potential slope failure. Safety ratios for potential slope failures indicates that the slopes are considered stable in the long-term drainage conditions. Site investigation was conducted to investigate the presence of peat on site. The investigation identified a layer of peat deposit in areas of the site which was no more than 2m in depth. As such, potential peat stability issues were ruled out at the proposed infrastructure locations.

Mitigation by design has been incorporated into the project to avoid potential effects from landslides. Mitigation measures for potential landslide/slope failure are set out in Chapter 9: Land, Soils and Geology. Mitigation measures relating to flood risk which could have a bearing on potential landslides are detailed in Chapter 10: Hydrology and Water Quality.

During the construction phase of the proposed development, an emergency response plan will be in place as set out in Section 6 of the CEMP in the unlikely event of a landslide/slope failure.

In relation to potential vulnerability of the project to major accidents and natural disasters it is concluded that the potential susceptibility of the project to major accidents and or natural disaster of the proposed Ballinagree Wind Farm is negligible.

11.7.4 Potential Impacts – Human Health – Decommissioning

The decommissioning phase of the proposed development, as described in Section 3.8 of this EIAR, provides for the removal of turbines and associated infrastructure from the site. The potential impacts associated with decommissioning phase in relation to human health will be similar to those associated with construction phase as detailed in Section 11.7.2.

Decommissioning works will include removal of above ground structures including the turbines, mountings, and fencing. The proposed on-site substation will be taken in charge by EirGrid or ESB following decommissioning. During the decommissioning works there is potential for significant impact to human health and safety for construction workers on site. These impacts are similar to those set out in section 11.7.2. Potential impacts to human health and safety on-site will be prevented through best practice methods as per the construction phase CEMP and will include staff training and knowledge of the site-specific decommissioning plan. Once mitigation measures and best practice construction site methods are followed, potential negative impact on human health and safety is expected to be imperceptible and temporary.

During the decommissioning works there is potential for negative impact on health and safety of the public. Similar to Section 11.7.2, impacts are associated with the presence of a construction crew, increased traffic, presence of heavy goods vehicles and machinery, potential obstructions on the public road and potential obstruction to recreation and amenity trails. Potential impact to public health and safety during the decommissioning phase is considered temporary moderate and negative.



However, a Construction and Environmental Management Plan for decommissioning works will be followed, clear signage will be utilized on public roads and walkways and the community will be informed of works prior to commencement to avoid any potential negative impact to public health and safety. Once good practice is followed, the potential for negative impact on public health and safety is expected to be temporary and not significant.

11.7.5 Mitigation Measures – Human Health & Safety

11.7.5.1 *Mitigation Measures – Construction & Decommissioning*

To maintain safety and avoid health impacts on construction workers and the general public, best practice site safety and environmental management will be maintained. The proposed development will be designed, constructed, operated and decommissioned in accordance with the following:

- Safety, Health & Welfare at Work (Construction) Regulations 2013
- Safety, Health & Welfare at Work Act 2005
- Safety, Health & Welfare at Work (General Applications) Regulations 2007

All construction staff will be adequately trained in health and safety and will be informed and aware of potential hazards. A Construction and Environmental Management Plan is included in Appendix 3.1, will be circulated to all construction workers which will detail safety protocol and methodology. Furthermore, site investigation has been completed and mitigation has been proposed as detailed in Chapter 9: Lands, Soils and Geology and Chapter 10: Hydrology and Water Quality.

All hazards will be identified, and risks assessed. Where elimination of the risk is not feasible, appropriate mitigation and/or control measures will be established. The contractor will be obliged under the construction contract and current health and safety legislation to adequately provide for all hazards and risks associated with the construction phase of the project.

FÁS Safe Pass registration cards are required for all construction, delivery and security staff. Construction operatives will hold a valid Construction Skills Certificate Scheme card where required.

The developer is required to ensure a competent contractor is appointed to carry out the construction works. The contractor will be responsible for the implementation of procedures outlined in the Safety & Health Management Plan.

In relation to COVID-19, up to date HSE guidance will be consulted regularly in line with HSA recommendations and all reasonable on-site precautions will be taken to reduce the spread of COVID-19 on construction sites, should the virus be prevalent at the time of construction.

Once mitigation measures and health and safety measures are followed, the potential for impact on human health on the construction site during construction and decommissioning is expected to be not significant and temporary to short-term.

Public safety will be addressed by restricting access to the public in the vicinity of the site works during the construction and decommissioning stage. The construction site and associated recreation trails will be closed to the public for the 18-24 month construction period as well as the decommissioning period. This measure aims to avoid potential injury to members of the public as a result of construction activities.



Where recreational trails are closed to the public during construction and decommissioning, signage will be provided indicating alternative routes for walkers which avoid the construction site. This aims to avoid potential confusion and disorientation to recreation users as well as maintaining public safety in proximity to the construction site.

Appropriate warning signage will be posted at the construction site entrance, directing all visitors to the site manager. Appropriate signage will be provided on public roads approaching site entrances and along haul routes.

In relation to the TDR, extra safety measures will be employed when large loads are being transported, for instance, Garda escort will be requested for turbine delivery and a comprehensive turbine delivery plan will be utilised to avoid potential impact to human safety for road users and pedestrians. A traffic and transport assessment has been completed and is detailed in Chapter 13: Traffic and Transportation.

For the installation of the grid connection cable in the public road, a detailed traffic management plan will be developed in discussion with locals who will be directly impacted by the works, and in agreement with the Local Authority. Public consultation will be conducted along the grid cable route to inform local residents ahead of construction and decommissioning works.

Once mitigation measures and health and safety measures are implemented and followed, the potential for impact on human health for members of the public during construction and decommissioning of the proposed project is expected to be not significant and temporary to short-term.

11.7.5.2 Mitigation Measures - Operational

For operation and maintenance staff working at the proposed wind farm, appropriate site safety measures will be utilised during the operational phase by all permitted employees. All personnel undertaking works in or around the turbines will be fully trained and will use appropriate Personal Protective Equipment (PPE) to prevent injury.

Equipment within high voltage substations presents a potential hazard to health and safety. The proposed substation will be enclosed by palisade fencing and equipped with intruder and fire alarms in line with ESB and EirGrid standards.

All electrical elements of the proposed development are designed to ensure compliance with EMF standards for human safety.

All on-site electrical connections are carried by underground cable and will be marked out above ground where they extend beyond the track or hardstanding surface. Details of cables installed in the public road will be available from ESBN.

Lightning conductors will be installed on each turbine as all structures standing tall in the sky require this protection. Turbines specifically require this to prevent power surges to electrical components.

Turbines will be fitted with ice detection systems which will stop the turbine from rotating if ice is forming on a turbine blade. This aims to prevent ice throw which can cause injury.

Rigorous statutory and engineering safety checks imposed on the turbines during design, construction, commissioning and operation will ensure the risk posed to humans is negligible. 24-hour remote monitoring and fault notifications are included as standard in the Turbine Operations and Maintenance Contracts.



In addition to scheduled maintenance, the maintenance contracts will allow for call out of local engineers to resolve any issues as soon as they are picked up on the remote monitoring system.

Access to the turbines inner structure will be locked at all times and only accessed by licenced employees for maintenance.

In line with the Health Service Executive’s Emergency Planning recommendations, any incident which may occur at the site which requires emergency services, incident information will be provided in the ‘ETHANE’ format.

- Exact location
- Type of incident
- Hazards
- Access and egress
- Number of casualties (if any) and condition
- Emergency services present and required.

The design of the proposed wind farm has considered the susceptibility to natural disasters. The proposed site drainage will mitigate against any potential flooding risk with the use of swales as described in Chapter 10 – Hydrology and Water Quality.

Coillte fire plans as detailed in section 11.7.3.4 above are reviewed and updated on a regular basis. A nominated competent person shall carry out checks and routine maintenance work to ensure the reliability and safe operation of fire-fighting equipment and installed systems such as fire alarms and emergency lighting. A record of the work carried out on such equipment and systems will be kept on site at all times.

Shadow flicker detection systems will be installed on all turbines in order to reduce potential occurrence of shadow flicker on nearby receptors. This is further detailed in Chapter 12: Shadow Flicker.

In order to ensure the proposed wind farm is compliant with the noise limits, some of the turbines may need to be operated in noise reduced modes of operation in order to protect residential amenity. Details of these mitigation measures are set out in Chapter 7: Noise and Vibration.

The wind farm system shall include a kill switch that can be operated at any time with an overriding manual shutdown system in case of an emergency.

11.7.6 Residual Impacts – Human Health

Through various aspects of the design process for the Ballinagree Wind Farm, negative residual impact on human health is expected to be imperceptible. This is due to the significant setback distance from nearby dwellings, the reduction of potential occurrence of shadow flicker on neighbouring dwellings through the use of shadow flicker detection systems, and noise control measures to reduce potential noise impacts on nearby receptors. Furthermore, the mitigation measures as set out throughout the EAIR will prevent any potential significant negative impacts on human health during the construction and decommissioning phases.

Long-term positive imperceptible residual impacts will occur due to the provision of clean, renewable electricity. The operation of the Ballinagree Wind Farm will result in the net displacement of c. between 132,414 – 148,124 tonnes of CO₂ per annum which would otherwise be emitted through the burning of fossil fuels.



The use of upgraded forest and agricultural tracks and provision of new recreation trails and associated infrastructure will provide opportunities for health gain through encouragement of exercise. This has potential to provide a long-term moderate, positive impact to human health in the locality.

11.8 Renewable, Non-Renewable Resources and Utility Infrastructure

This section provides a comprehensive overview of the material assets (renewable and non-renewable resources, and utility infrastructure) of the receiving environment in order to provide an understanding of the potential effects which the proposed development may have on renewable and non-renewable resources, and utility infrastructure. The waste produced as a result of the proposed development is also considered in this section.

The Geological Survey of Ireland in their scoping response for the Ballinagree Wind Farm Project highlighted potential impacts on the extractive industry and mineral resources in the area of the site as a result of the proposed development. This has been considered with respect to non-renewable resources in this section. The Felling Section of the Department of Agriculture, Food and the Marine also set out the need to consider removal of areas of forestry and the replanting of this forested area in a sustainable manner. This is considered in this section with regard to renewable resources.

11.8.1 Existing Environment – Renewable, Non-Renewable Resources and Utility Infrastructure

A number of active and historic quarries and mineral occurrences are located within 15km of the Main Wind Farm Site, as detailed in the GSI Online Minerals Database accessed via the Public Data Viewer. These consist of aggregates, asphalt and macadams, sand, stone and gravel quarries and recorded mineral occurrences, none of which are located within the site boundary. The GSI Aggregates Database indicates that there is a mixture of very low, low and moderate potential for crushed rock or granular aggregate across much of the windfarm site.

Other non-renewable resources within the site area includes peat boglands located to the north, west and south west of the wind farm site. The sections of peat bogs are indicated in Figure 11-4: Corine Land Cover. Site investigation revealed that peat deposits across the site were up to 2m in depth.

Renewable resources at the site include a significant plantation of commercial forestry which is subject to an ongoing maintenance, felling and replanting schedule. This plantation covers a significant area of the proposed wind farm site. Further commercial forestry is present in the wider landscape north and west of the site. Wind resource is above average at the site location. The 2013 Sustainable Energy Authority of Ireland (SEAI) Wind Speed Atlas identifies the site as having an average wind speed of up to 11 m/s at 100 m above ground level.

No significant renewable and non-renewable resources have been identified along the Grid Connection. Sections of commercial forestry have been identified adjacent the proposed TDR route.

As part of the scoping and consultation process for the proposed project, searches of existing utility services were carried out to identify areas where major assets exist such as high voltage electricity cables or gas mains. Private utility and telecommunications companies were also consulted during this period. The Boggeragh to Clashavoon 110kV overhead line runs through the north east of the wind farm site, located to the east of T16 and to the west of T18. No other major utility infrastructure was identified at the proposed wind farm site or along the proposed grid route.



Some minor elements of utility infrastructure and elements of public and private property were identified along the TDR route which will require alteration or removal. This includes temporary removal of street furniture, road signage and overhead utilities and application of load bearing surfaces to existing roundabouts. These elements are identified in section 3.5.6.1 of this EIAR and further detailed in Chapter 13: Traffic and Transportation.

11.8.2 Potential Impacts – Renewable, Non-Renewable Resources and Utility Infrastructure - Construction

11.8.2.1 *Non-renewable Resources*

The construction of the Ballinagree Wind Farm will impact on natural resources such as aggregates which will be sourced from batching plants, quarries and pits in proximity to the site. The quarry identified in proximity to the site which can supply the appropriate grade of rock is as follows:

- Bweeng Quarry, Co. Cork. Located 13km from the Ballinagree Wind Farm Site.

There are 3 no. proposed borrow pits located at the wind farm site identified as potential sources of site-won general fill (Class 1 material). These have potential to provide up to 30,000m³ of site won general fill as detailed in Chapter 9: Land Soils and Geology. Existing tracks have been used where possible and the layout was designed to minimise the length of new track required in order to reduce the requirement for such stone material. In addition, it is likely that a small amount of granular material may be required to maintain access tracks during operation which could impact the source quarry. The use of site-won and imported material will have a slight, permanent negative impact on non-renewable resources of the area. This impact is considered to be imperceptible in the long-term.

Peat excavation will occur in areas where infrastructure will be installed. The existing peat identified at the site is limited in extent at up to 2m in dept. Any peat removed will be used for reinstatement purposes around turbine bases, hardstands and borrow pits within the wind farm site. The impact to peat resources is considered imperceptible.

11.8.2.2 *Renewable Resources*

The proposed development is intended to capture the renewable wind resource at the site. There will be no negative effects on the renewable energy resource of the receiving environment as this project represents a net provider.

It is considered that the proposed development will have an overall long-term positive impact in terms of carbon reduction and climate change. It will assist Ireland in meeting its target of producing 80% of electricity from renewable sources by 2030 as set out in the Climate Action Plan 2021

Trees felled for development purposes will be replanted at another unplanted location as required by Irish Forest Service Guidelines. The proposed development will require the felling of forestry within and around the infrastructure to accommodate the construction of turbine foundations, hard stands, crane pads, access tracks, site compounds, met masts, borrow pits and substation. The estimated area of tree clearing required for the proposed development will be approximately 88 ha. A felling licence will be sought from the Forest Service prior to any tree felling and will include the provision of relevant replant lands. The impact on renewable timber resources within the study area as a result of felling is considered long-term, slight and negative. However, the overall effect of the project on renewable timber resources at a national scale will be neutral as the 88 ha of felling will be replanted.



11.8.2.3 Utilities Infrastructure

Major utility infrastructure within the wind farm site includes the Boggeragh to Clashavoon 110kV overhead line which passes through the north eastern section of the site. The construction phase of the proposed development is not expected to affect the existing overhead line as construction will not take place in the vicinity of the line.

Appendix 13.2 of this EIA includes the Turbine Delivery Route Survey Report. This report details where overhead utilities, poles, lighting columns, bollards and signage will require temporary removal and sets out where tree removal and wall removal will be required at certain points along the route to accommodate the delivery of wind turbine components.

The removal of overhead utility infrastructure has the potential to cause a brief to temporary non-significant negative impact on nearby dwellings and commercial/industrial activities in the town of Millstreet. Other overhead utilities have been identified for temporary removal between Millstreet and the wind farm site, along the L2758 Butter Road. This has potential to cause a brief to temporary non-significant negative impact on nearby dwellings and farmsteads.

Lighting columns will require temporary removal at various points along the TDR. This is expected to have a temporary non-significant negative impact on utility infrastructure. The TDR Report details the locations and extent of the accommodation works required.

There is potential for turbine delivery to negatively impact on major road infrastructure if unmitigated. Turbine delivery could potentially cause traffic disturbance and damage to road infrastructure if not properly planned and assessed. Potential impact on road infrastructure is detailed in Chapter 13: Traffic & Transportation.

Potential effects on telecommunications are discussed in Chapter 16: Telecommunications and Aviation. As set out in Chapter 16, the proposed development will have no impact on the telecommunications signals during the construction of the project, due to the absence of telecommunications links in the area.

Desktop research and consultation with utilities providers did not identify any significant services along the grid route. The construction of the cable trenches along public roads will have a temporary, slight, negative impact on the roads concerned during construction, with some roads likely to require re-surfacing.

Importation of materials and equipment for the Ballinagree Wind Farm will also increase shipping traffic at the ports being used and increase freight on the motorway, national primary routes and regional road network. This impact is assessed in Chapter 13: Traffic and Transportation.

11.8.2.4 Waste

During the construction phase of the proposed development, waste will be generated due to the various construction activities and materials required for the installation of infrastructure at the wind farm site, grid route and TDR.

In line with the National Waste Management Guidelines for the circular economy and European Waste Management Hierarchy, the developer and appointed contractor will aim to prevent, reduce, reuse and recover as much of the waste generated on site as practicable and to ensure the appropriate transport and disposal of residual waste off site.



Any waste generated during the development construction phase will be collected, source separated and stored in dedicated receptacles at the temporary construction compounds.

It is envisaged that the following categories of waste will be generated during the construction of the project:

- municipal solid waste (MSW) from the office and canteen
- construction and demolition waste
- waste oil/hydrocarbons
- paper/cardboard
- timber
- steel

A fully authorised waste management contractor will be appointed prior to construction works commencing. This contractor will provide appropriate receptacles for the collection of the various waste streams and will ensure the regular emptying/and or collection of these receptacles.

Waste will be reused onsite for other suitable purposes where possible. For example:

- re-use of shuttering etc. where it is safe to do so
- re-use of rebar cut-offs where suitable
- re-use of excavate materials for screening, berms etc.
- re-use of excavated material etc. – will be used as suitable fill elsewhere on site for the new site tracks, the hardstanding areas and embankments where possible.

Receptacles will be provided for the separation and collection of dry recyclables (paper, cardboard, plastics etc.), biological waste (canteen waste) and residual waste. Receptacles will be clearly labelled, signposted and stored in dedicated areas. The following sourced segregated materials container will be made available on site at a suitable location:

- timber
- ferrous metals
- aluminium
- dry mixed recyclables
- packaging waste
- food waste.

Residual waste generated on-site may require disposal. This waste will be deposited in dedicated receptacles and collected by the licensed waste management contractor and transported to a licenced facility by the licenced contractor. Licenced facilities in the area are identified in Chapter 3. All waste movements will be recorded, of which records will be held by the waste manager on-site.

Any contaminated soils will be handled, removed and disposed of in accordance with statutory requirements for the handling, transportation and disposal of waste.



Waste management during the construction stage is set out in the CEMP included in appendix 3.1 of Volume 3 of this EIAR. Once these best practice measures are put in place, waste produced during the construction stage will have an imperceptible impact on the receiving environment.

11.8.3 Potential Impacts – Renewable, Non-Renewable Resources and Utility Infrastructure - Operational

Once the Ballinagree Wind Farm is operational, the potential for negative effects on material assets is minimal. Maintenance of access tracks and infrastructure may require small amounts of imported fill, however, the impact of this is likely to be slight/imperceptible.

A setback distance has been imposed between the proposed wind turbines and the existing Boggeragh to Clashavoon 110kV overhead lines. No impact on existing major utility infrastructure is expected at the wind farm site during the operational phase.

The direct effect of electricity generated by the proposed development will give rise to a reduction in the quantity of fossil fuels required for electricity generation across the State. This will give rise to a long-term slight positive impact on renewable energy resource and will contribute to reducing Ireland's dependency on imported fuel resources.

As set out in Chapter 16, the proposed development will have no significant impact on existing telecommunications signals during the operational phase of the project.

Significant volumes of waste is not expected to be produced during the operation phase of the proposed development. In the event that maintenance works are required at the wind farm site, grid route or TDR during the operational phase, a CEMP will be in place, and waste management procedures as set out in section 11.8.2.4 will be followed. Any waste produced during the operational phase of the wind farm will have an imperceptible impact on the receiving environment.

11.8.4 Potential Impacts – Renewable, Non-Renewable Resources and Utility Infrastructure – Decommissioning

The potential impacts associated with decommissioning phase will be similar to those associated with construction but of a reduced magnitude.

Decommissioning works will include removal of above ground structures including the turbines and met masts. Turbine foundations and access tracks will be left in situ. The proposed on-site substation building will be taken in charge of by Eirgrid / ESB which will have a long-term slight positive impact on electricity infrastructure provision in the area. Similarly, the underground grid cable will remain in situ and will become a part of the national grid resulting in a long-term slight positive impact on electricity infrastructure provision in the area.

There will be no significant negative impacts on renewable and non-renewable resources during the decommissioning phase. No likely negative impacts on utility infrastructure are expected during the decommissioning phase.

Increased traffic numbers on the local, regional and national roads will have a temporary slight negative impact on the road network due to increased traffic.

Waste will be produced as a result of the decommissioning activities.



The CEMP in Appendix 3.1 will be implemented during the decommissioning phase and waste management procedures as set out in section 11.8.2.4 will be followed. Decommissioned turbine components will be reused and recycled where possible and all non-reusable or recyclable materials will be disposed of in a licenced waste facility. As a result, the waste produced during the decommissioning phase will have an imperceptible impact on the receiving environment.

11.8.5 Mitigation Measures – Renewable, Non-Renewable Resources and Utility Infrastructure

Existing services along the proposed grid connection cable route have been predicted through a desktop study and will be confirmed in the pre-construction surveys prior to construction. This will minimise the impact in terms of disruption or damage to existing utilities. It is not intended to divert existing services but instead, where possible, the cable will be laid above or below existing services. Communication with service providers will be maintained for the duration of the construction works where required.

Non-renewable resources of stone and fill will be sourced locally and will be excavated from on-site borrow pits insofar as possible to minimise transportation distances, reducing CO2 emissions.

The 88 hectares of commercial forestry which will be felled at the proposed Ballinagree Wind Farm site will be replanted at alternative lands under a felling licence.

Where services and street furniture are required to be removed temporarily to accommodate turbine delivery, residents and business in proximity to the works will be informed in advance.

A comprehensive turbine delivery procedure will be implemented between Foynes Port and the wind farm site which will include safety procedures and Garda escort in accordance with the Traffic Management Plan contained in Appendix 3.1. The procedure will avoid impact on the roads involved with the TDR including the N69, M7, M20, N20, N72, R583 and L2758 leading to the site. It is likely that turbine delivery will take place outside of regular travelling/commuting hours in order to avoid potential traffic impacts on major routes.

A Construction Waste Management Plan (Appendix 3.1) has been prepared for the proposed Ballinagree Wind Farm in line with the "Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects" (2006) as published by the Department of the Environment, Community and Local Government and supported by the Southern Region Waste Management Plan 2015-2021.

The Waste Management Plan will be finalised in accordance with the CEMP following the appointment of the contractor for the main construction works and will take cognisance of any newly published waste management policy.

11.8.6 Residual Impacts – Renewable, Non-Renewable Resources and Utility Infrastructure

Non-renewable resources such as aggregates and cement are required onsite during the construction phase. This will result in a permanent negative imperceptible residual impact on non-renewable resources.

The proposed development will result in a long-term slight positive residual impact on non-renewable resources by offsetting the use of fossil fuels in electricity generation over the lifetime of the project.

The proposed on-site substation and underground grid route cable will be taken in charge of by Eirgrid or ESB following decommissioning, providing a long-term slight positive residual impact on electricity infrastructure in the area.



Residual waste from the construction, operation and decommissioning phases will be disposed of in a licenced waste facility. This will result in a permanent slight negative impact to capacity of licenced waste facilities in the area of the proposed development.

11.9 Do-Nothing Scenario

In the event that the proposed Ballinagree Wind Farm does not proceed, the existing land use on the site will continue in its present form consisting of commercial forestry and agricultural land for the foreseeable future. The existing recreation walking routes, including existing forestry tracks will remain unchanged and the additional recreation potential for the site will not be realised.

In the absence of renewable energy development, it is possible that there will be a continuance of excessive greenhouse gas emissions and consumption of fossil fuels. The opportunity to harness the wind energy capacity of the site would be lost, further constraining the State from achieving its renewable energy targets of 80% by 2030. The net displacement of c. between 132,414 and 148,124 tonnes of CO₂ per annum as a result of the operational phase of the proposed development will not be achieved.

Overall renewable energy supply was 12% of gross final consumption in Ireland in 2019 (SEAI, 2020). The remaining 88% of energy came from fossil fuels indicating Ireland's heavy dependency on the importation of fossil fuels to meet its energy needs in transport, heat and electricity. This dependency on energy imports leaves Irish consumers exposed to fluctuating international oil and gas prices. Harvesting renewable, indigenous resources such as wind will help diversify the Irish generation portfolio and reduce Ireland's dependency on imported fuel resources. In the do-nothing scenario, the proposed 118 – 132 MW wind farm will not contribute to reducing fossil fuel dependency.

It is also envisaged that if the Ballinagree Wind Farm Project does not proceed, opportunity for employment relating to the construction, operation and decommissioning of the proposed development will be lost, resulting in a lost opportunity for potential economic activity in the County Cork Area. Development contributions and considerable commercial rates would not be made payable to Cork County Council by the developer, and no Community Benefit Fund Scheme will be put in place in the locality resulting in a lost opportunity for benefit to community infrastructure.

11.10 Cumulative Impacts

As part of the cumulative impact assessment included throughout this EIAR, planned, proposed, consented and existing developments/projects in the area of the wind farm site, grid route and TDR were considered for potential cumulative impacts on the receiving environment. As det out in section 11.2 above projects and proposed developments within 20km of the wind farm site were considered for the purpose of this assessment. Projects and proposed developments were also identified within the Grid Route and TDR corridor which falls within the wind farm 20km radius.

The list of all projects considered for the cumulative assessment are included in Appendix 1.2 of Volume 3 of this EIAR. Each of the projects listed in Appendix 1.2 were considered with respect to potential cumulative impacts on Population, Human Health and Material Assets. Projects where cumulative impacts were not likely to occur were discounted from the impact assessment as detailed below.



Development in the planning system as listed in Appendix 1.2 within the vicinity of the wind farm site, grid connection and TDR consisting of housing and agricultural developments were identified for potential cumulative assessment, however, these developments are small in scale and will have an imperceptible cumulative impact with the construction and operation of the proposed wind farm, in relation to population, human health and material assets due to the lack of interaction

There are a number of wind farms within 20km of the proposed development. The most proximate is the Boggeragh Wind Farm located ca. 1km east of the proposed wind farm site. The proposed development in combination with the Boggeragh Wind Farm will have a cumulative impact on land use in the area, introducing additional renewable energy land use to an established forested area, reducing the overall forestry resource of the area by ca. 88 hectares. The cumulative impact on forestry land use is expected to be long-term slight and negative in the study area but is considered neutral when account is taken of the provision of replant lands consisting of ca. 88 hectares.

The cumulative impact of the proposed development in combination with the Boggeragh Wind Farm and on Landscape and Visuals is detailed in Chapter 15: Landscape and Visual. The in-combination visual impact of the proposed development is considered to contribute an additional cumulative effect that is in the order of High-medium within the Boggeragh Mountains, which will reduce to Low in the wider surrounds of the study area. This has potential cumulative impact on residential amenity in proximity to the site. The significant setback distance between the proposed turbines and existing dwellings will reduce potential cumulative visual impact between the proposed wind farm and the existing Boggeragh Wind Farm with respect to residential amenity. Therefore, cumulative visual impact on residential amenity is considered long-term, non-significant and negative.

Cumulative noise impacts have been assessed for the proposed wind farm project in-combination with the existing Boggeragh 1, Boggeragh 2, Esk, Carriganimmy and Bawnmore Wind Farms, in relation to residential amenity. The cumulative predicted noise levels comply with the daytime and night-time noise limits derived using the Wind Energy Development Guidelines 2006, at all sensitive locations. However, for some receptors a new source of noise will be introduced into the soundscape and it is expected that there will be a slight to moderate significance of impact, with dwellings closest to the project with a long-term moderate significance of impact.

The consented Carragraigue Solar Farm is located approx. 5km north of the wind farm site. Should the consented solar farm be constructed at the same time as the proposed Ballinagree Wind Farm there is potential for temporary cumulative impact on human health as a result of construction works which may cause cumulative noise, vibration and dust at nearby dwellings, causing a negative impact on residential amenity. Due to the sparse population in proximity to the consented Carragraigue Solar Farm, the significant distance between the proposed wind farm and consented solar farm, and the significant setback from the proposed wind farm to nearby dwellings, cumulative impact on human health and residential amenity is considered temporary, non-significant and negative.

A consented Knockglass solar farm and the consented substation extension and battery storage at the Bawnmore Wind Farm are located within 2km of the Clashavoon Substation, the point of connection to the national grid for the proposed project. Should the consented developments be constructed at the same time as the proposed grid route, there is potential for negative cumulative effects on traffic as a resulting of additional HGV journeys to and from the area in combination with the road works required for the installation of the proposed grid route. This may have an in-combination effect on residential amenity as a result of noise and dust.



As detailed in Chapter 6: Air & Climate, the potential impact from dust on residential dwellings along the grid route is expected to be temporary slight and negative due to the nature of the construction along the proposed grid connection which will be a “rolling” construction site, meaning that these works will not be concentrated in any one area of the route for a long period of time. Similarly, noise impact at dwellings located along the grid route is expected to be temporary, moderate and negative, following mitigation.

The haul route identified for the Knockglass Solar Farm does not come in contact with the proposed grid route, therefore no in-combination impact is expected. The haul route identified for the consented substation extension and battery storage has potential to cross the proposed grid route works. It is expected that there will be 12 HGV trips per week accessing the consented development over a 3-month period. The low number of HGV trips in combination with the rolling nature of the proposed grid route works will not result in significant impact on residential amenity at dwellings along the proposed grid route.

The electricity generating capacity of the consented solar farms and battery storage developments as listed in Appendix 1.2, in combination with the generating capacity of the proposed wind farm, considered cumulatively will have a long-term significant positive cumulative impact on utility infrastructure and renewable energy resource in the greater area and would have a positive impact on national renewable energy resources as well as reduction in requirements for the use of non-renewable fossil fuels.

There is potential for a permanent moderate positive cumulative impact on recreation and amenity at the proposed Ballinagree Wind Farm site as a result of the proposed amenity trail and recreational infrastructure which will work in combination with the existing Duhallow Way, a national waymarked trail to improve the recreation offering at the site. This has potential to further improve health gain in the area and encourage use of the site for exercise.

11.11 Conclusion

The assessment of Population, Human Health and Material Assets has established the existing environmental conditions of the study area, including the Main Wind Farm Site, the Grid Connection and the Turbine Delivery Route (TDR) Area. Potential impacts were considered for the construction, operational and decommissioning phases of the proposed development as well as potential residual and cumulative impacts. Mitigation measures have been proposed where relevant. The Population, Human Health and Material Assets Chapter has been subdivided into the following topics for the purpose of the assessment:

- Population Trends;
- Socio-Economics, Employment and Economic Activity;
- Land Use;
- Recreation, Amenity and Tourism;
- Human Health and Safety;
- Renewable, Non-Renewable Resources and Utilities Infrastructure.

The population of the Main Wind Farm Site and Grid Connection were found to be of low density and dispersed when compared to averages of County Cork as a whole and the State. The TDR was found to have a higher population density due to its proximity to the built-up area of Millstreet.



The construction and decommissioning of the project will likely result in a short-term/temporary population growth in the Main Wind Farm Site, Grid Connection and TDR during working hours due to the influx of construction workers during the construction and decommissioning phases. However, permanent impact on the population of the study area is considered unlikely as a result of the proposed development of the Ballinagree Wind Farm due to the temporary nature of the construction works.

The economic profile of the Main Wind Farm Site, TDR and Grid Connection does not show any major disparities when compared to the National and County-wide average socio-economic statistics. In general, the baseline conditions of the study area shows healthy socio-economic characteristics.

Positive direct and indirect benefits to economic activity are identified during the construction and decommissioning phases due to the creation of construction jobs based in the area which is likely to provide employment opportunities for those living in the study area and surrounding areas of County Cork. The construction and decommissioning phases are likely to have a temporary positive economic impact on local businesses and services.

The operational phase of the proposed development has been identified as having a positive economic and social impact on the Wind Farm Area with the provision of a Community Benefit Fund which will contribute to social infrastructure in the area and financially benefit those in closest proximity to the proposed wind farm. Other positive economic benefits as a result of the operational phase of the proposed Ballinagree Wind Farm includes reducing the State's reliance on fossil fuels which will reduce electricity prices, economically benefiting the consumer in the long-term throughout the State. Rates and development contributions will also benefit the local authority.

The land use of the Main Wind Farm Site consists of commercial forestry, agriculture and recreation in the form of walking trails. An existing wind farm is located directly to the north and east of the site. The area of the proposed grid connection is primarily agriculture and the land use along the TDR is agriculture, small pockets of forestry and town centre and commercial premises. Slight, temporary impacts to the existing land use along the Grid Connection and TDR is expected during the construction phase. At the proposed wind farm site and BEMP 88 hectares of commercial forestry will be removed to allow for the proposed development. It is proposed to replant approximately 88 hectares of forestry on alternative lands. The recreation land use of the site will also be temporarily negatively affected during the construction phase due to the closure of the site for construction purposes. This is required to maintain public safety during the construction phase. The operational phase is not expected to have a significant impact on land use in the area of the proposed wind farm.

With respect to Recreation, Amenity and Tourism, trail walking and hiking was identified as the main tourism and recreation potential for the Wind Farm Area with the existing Duhallow Way national waymarked trail and existing forestry tracks located at the site. Sections of trail at the wind farm site will be temporarily closed to the public including a short section of the Duhallow Way and areas of Coillte forestry tracks. Users will be appropriately notified and diverted to alternative routes along the public road. The operational phase will see the upgrade and construction of 18km of tracks which will be utilised for recreation. The inclusion of these elements in the project will maintain and improve recreation activity at the site and will have a long-term significant positive impact on recreation and amenity. This element of the project will also contribute to the aims and objectives of the Cork County Development Plan (2014) in providing additional green infrastructure.

Potential impacts on human health and safety have been identified for both construction workers and the general public as a result of the construction and decommissioning of the Ballinagree Wind Farm. Best practice construction methods and improved safety measures on public roads have been identified as measures to prevent potential accidents during the construction and decommissioning works. Potential health impacts from noise and electromagnetic fields during the operational phase are considered negligible.



Furthermore, the proposed Ballinagree Wind Farm’s potential susceptibility to major accidents and natural disaster is considered negligible.

It is anticipated that the proposed Ballinagree Wind Farm will avoid significant negative impact on renewable and non-renewable resources by sourcing local building materials where possible and providing site-won materials, therefore reducing the requirement of transport, reducing CO2 emissions. Replant lands will be provided to replace forestry lands required for the development of the wind farm. The proposed Ballinagree Wind Farm was found to have an overall positive impact on utility infrastructure providing clean energy to the national grid and reducing dependency on fossil fuels. Furthermore, the proposed development will have no impact on existing telecommunications signals during the operational phase of the project as confirmed through consultation with telecommunications providers.

Cumulative impacts have also been considered in relation to proposed, consented and constructed projects located nearby the wind farm site, grid route and TDR. No significant in-combination impacts were identified in relation to population, human health and material assets.

In conclusion, once mitigation measures set out throughout this EIAR are implemented, it is unlikely that significant negative impacts to population, human health and material assets will occur as a result of development of the proposed Ballinagree Wind Farm.



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