5 Population and Human Health

5.1 Introduction

5.1.1 Background and Objectives

This chapter of the EIAR assesses the impacts of the Development on population and human health. Where negative effects are predicted, the chapter identifies appropriate mitigation strategies therein. The assessment will consider the potential effects during the following phases of the Development:

- Decommissioning of the Operational Barnesmore Windfarm – removal of the existing turbines
- Construction of the Development – installation of the new turbines
- Operation of the Development
- Decommissioning of the Development – removal of the new turbines (final phase)

The initial decommissioning of the Operational Barnesmore Windfarm and the construction of the Development are likely to occur partly in tandem and would have a greater effect than if the two processes were to arise at different times. This represents a worst-case scenario for assessment purposes. Any effects arising as a result of the future decommissioning of the Development, are considered to be no greater than the effects arising when these two phases are combined. As a result, the final decommissioning phase has not been considered further in this assessment.

The Development refers to all elements of the application for the repowering of the Operational Barnesmore Windfarm (**Chapter 2: Development Description**). The Development design layout has provision for the retention and re-use of existing footprint locations, in part, of the Operational Barnesmore Windfarm.

This chapter of the EIAR is supported by Figures provided in Volume III. A glossary of common acronyms can be found in **Technical Appendix 1.4** in Volume IV of this EIAR.

5.1.2 Relevant Legislation and Guidance

The population and human health section of this EIAR is carried out in accordance with legislation and guidance contained in **Chapter 4: Planning Policy Context**.

The design and construction of the Development including the installation of associated equipment such as switchgear, substations etc. is governed by the 2005 Safety, Health and Welfare at Work Act, The Safety, Health and Welfare at Work (General Application) Regulations 2007 and also by S.I. 291 The Safety, Health and Welfare at Work (Construction) Regulations 2013.

The Revised EIA Directive Consultation (Section 1.2.2) states that:

> *"It is intended that the consideration of the effects on populations and on human health should focus on health issues and environmental hazards arising from the other environmental factors, for example water contamination, air pollution, noise, accidents, disasters, and not requiring a wider consideration of human health effects which do not relate to the factors identified in the Directive".*

5.1.3 Assessment Structure

In line with the revised EIA Directive and current (draft) EPA guidelines the structure of this chapter is as follows:

- Assessment Methodology and Significance Criteria – a description of the methods used in baseline surveys and in the assessment of the significance of effects
- Baseline Description – a description of the socio-economic profile of the local area of the Development i.e. local electoral areas and County Donegal, based on a desk-based study using Central Statistics Office (CSO) data
- Assessment of Potential Effects –identifying the ways in which the population and human health of the area could be affected by the Development
- Mitigation Measures and Residual Effects – a description of measures recommended to avoid, prevent, reduce or, if necessary, offset any potential significant adverse effects and a summary of the significance of any residual effects of the Development after mitigation measures have been implemented

- Cumulative Effects – identifying the potential for effects of the Development to combine with those from other Developments to affect the population and human health
- Summary of Significant Effects
- Statement of Significance

5.1.4 Scope of the Assessment

The effect of a development on population and human health includes the following broad areas of investigation:

- Population and Settlement Patterns
- Economic Activity and Tourism
- Employment
- Topography and Land Use
- Accidents and Disasters (incorporating Safety and Health). A Health and Safety Plan for the Development will be drawn up during Phase 1 and will address accidents and disasters. Referral is therefore limited in this chapter.

Where a significant negative impact can be foreseen, it is prevented, reduced, avoided or, if necessary, offset by way of practical mitigation measures. This assessment considers the following criteria:

- Sensitive receptors in the area
- Existing land use in the area
- General amenities in the area
- Potential effects from water, noise, shadow flicker, air quality and traffic

These criteria are assessed for the initial decommissioning and construction phase and the operational phase of the Development.

5.2 Assessment Methodology

In line with the revised EIA Directive and current (draft) EPA guidelines this chapter includes the following elements:

- Details of Methodologies utilised in the context of legal and planning frameworks
- Baseline Descriptions
- Assessment of Potential Effects (construction, operational and decommissioning stages)
- Detailed Mitigation Measures
- Assessment of Cumulative Impacts
- Summary of Significant Effects and Statement of Significance

A desk study was undertaken of the Central Statistics Office (CSO) data and a review of the Donegal County Development Plan (CDP) 2018 – 2024, alongside a number of websites relating to the area. Consideration was also given to the 2015[1] report produced by the EPA entitled The *'Investigation into the Assessment of Health Impacts within National Environmental Regulation Processes*' that outlines how human health impacts are dealt with, throughout the European Union (EU) by environmental regulators with an emphasis on the role at the planning / environment interface.

5.2.1 Definition of Study Areas

Four geographical Study Areas have been outlined for this assessment (**Figure 5.1**). While the greater geographical Study Areas (3 and 4) provide a baseline of statistical data for this chapter, they are not considered for local impacts of this assessment. Note: Study Area 1 lies within Study Area 2 and information outlined for Study Area 2 incorporates data for Study Area 1. The four Study Areas are outlined below:

Study Area 1: **The area of the Development and environs (10 km)** (within the Republic of Ireland). In order to make inferences about the population and other statistics in the vicinity of the Site, district electoral divisions (DEDs) were analysed. The entire Site comes under one Municipal Division (MD), Donegal and electoral division (ED) 'Clogher' (land area 35.7 km^2) that can be separated into distinct townlands, 'Keadew Upper' (9.98 km^2) to the north and 'Cullionbuoy' to the south (**Figure 5.2**). The Haul Route to the Site will pass through the townland also known as 'Clogher'. While some

[1] Golder Associates (2015) *Investigation into the Assessment of Health Impacts within National Environmental Regulation Processes*. Available online at: http://www.epa.ie/pubs/reports/research/health/assessmentofhealthimpactsreport.html [Accessed on 12 September 2019]

assessments will reflect local DED's where datasets are available, other assessments are more widespread and encompass a 10 km geographical boundary.

Study Area 2: **Donegal County** (4,861 km^2)

Study Area 3: **The North and West region**: Counties Donegal, Cavan, Monaghan, Leitrim, Mayo, Sligo, Roscommon and Galway (25,799 km^2)

Study Area 4: **The Republic of Ireland** (70,275 km^2)

Descriptive terminology for impact assessment follows the systematic method of description of the EPA Guidelines (2017), as outlined in **Chapter 1: Introduction**, **Table 1.4**.

5.2.2 Consultation

Consultation with relevant organisations was initiated during the initial stage of the EIA to identify any effects that could be initiated by the Development. A summary of the findings is detailed in **Table 5.1**.

Table 5.1: Summary of Consultation response on Human Health

Consultee	Type and Date	Summary of Consultee Response
Environmental Health Service	Letter in Response to Scoping Report received on 24.06.19	Recommendations were made on ***Geological Impacts, Water Quality, Noise and Vibration, Shadow Flicker*** and ***Air Quality***. These have been dealt with separately, in respective Chapters, 9,10, 12 and 14. • A section on ***Ancillary facilities*** also noted that the report *should provide location details of site office, construction yard(s), fuel storage depot, sanitary accommodation, canteen, first aid, disposal of wastewater and the provision of potable drinking water supply*. A Safety and Health Plan for the Development will be drawn up during the Pre-Initial Decommissioning and Construction Phase and will deal with the latter two items, while Drawing No. 5952-1000-1001 outlines the location of the former named facilities. **Opportunity for Health Gain: "***The proposed Development should be assessed with a view to where possible health gains, such as creating public amenities (greenways/cycle-paths/walking routes etc.) may be incorporated into the plan".*

With respect to the Revised EIA Directive, Section 1.2.2 (outlined in Section 5.1.2) and the Development, this amalgamates the findings of other assessments undertaken as part of the EIA process. Limited interactions with human health are possible and consideration has been given to the findings of the following assessments:

- Hydrology and Hydrogeology: Chapter 9
- Noise: Chapter 10
- Shadow Flicker and Electromagnetic Interference: in Chapter 12
- Air and Climate: in Chapter 12
- Traffic and Transportation: Chapter 14

Where appropriate, mitigation measures have been proposed to avoid, prevent, reduce or, if necessary, offset any identified significant adverse effects.

The Safety and Health Plan will deal with risks of accidents and disasters and measures to prevent and avoid same. This is not dealt with further in this chapter.

5.3 Baseline Description

5.3.1 Population and Settlement Patterns

Study Area 1: Barnesmore and environs (10 km)

There are no defined community settlements with a population greater than greater than 2,500 within the 10 km radius of the Development. Two settlements exist proximate to the Site Boundary, namely Ballybofey/ Stranorlar located 12 km northeast (population 4,852 persons) and Donegal town located 11 km southwest, with a population of 2,618, according to the 2016 census. Over the last five years, Donegal County Council (DCC) have granted local planning permissions in the 'Clogher' electoral division area (35.7 km^2) and include alterations to existing dwelling houses and the development of new housing[2]. The Clogher 2015 statistics note 317 occupied residences and a total population of 848. The nearest planning development is located 2.7 km southwest of the Site Boundary in the townland of Cullionboy.
Currently, the nearest residential building is located at 1.3 km from the Site Boundary; this building is unoccupied and in disrepair. The next nearest dwelling (most likely occupied) is at a distance of 1.8 km.

The Site location and the wider environs has a population density of less than 22 persons per km^2 (**Figure 5.3**).

Roads leading to the Site will be accessed through the Clogher electoral area, but no turbines will be located in this area. The Site and its wider environs are classified as a 'stronger rural area' in the County Donegal CDP (2018-2024). According to the 2011 census statistics, Keadew Upper had ten private households in its catchment area, with two unoccupied; population count was 23 persons (13 male and 10 female). T1 -T8 will be located in this electoral area. Cullionbuoy area to the south was noted to have a population count of 45 persons (23 males: 22 females) in sixteen households (4 houses in the area were unoccupied). Five turbines (T9-T13), will be located in this area.

The Landscape Character Assessment (LCA) of the windfarm area itself is Croaghnameal Border and Uplands (covering approximately 1,800 ha) and is characterised as a remote area, with no settlement within the LCA.

Study Area 2: Donegal

NPF has projected a transitional population expansion (rounded to the nearest 500) from 158,000 in 2016 to between 173,500 – 176,500 by 2026 and 179,500-183,500 by 2031 in Donegal. Census data over the period 2011- 2016 shows that the population of County Donegal decreased by 1.5% to 158,755 persons (decrease of 2,382 persons) coinciding with economic downturn and recession. In terms of the components of population change during the census period 2011-2016, both the rate of natural increase fell and there was a net outward migration in County Donegal. This trend corresponds to the comparatively high levels of in-migration experienced over the period 2006-2011. In the context of the State, County Donegal experienced the most significant outflows of migration followed by South Dublin and Counties Limerick, Mayo and Galway. Although the rate of natural increase in County Donegal (5.4) in 2016 is lower than the state average (8.5), it does not mirror the rate of net migration (which is the lowest in the country), but rather it tabulates as the seventh lowest in the State, over the census period 2011- 2016.

Taking a longer-term view over the period 1971-2016 (45 years), the population of County Donegal has increased by almost 50,500 persons demonstrating positive-growth patterns, whilst also demonstrating cycles of economic and population decline within this period. Positive population growth is also recorded over the ten-year period of 2006-2016 at a rate of 7.8% per annum. Phase one of the County Development Plan (CDP) population target relates to the life of the plan (2018-2024) and provides for an average annual growth rate of 1.1% over the life of the plan, thus sustaining existing levels of land supply for housing purposes, providing for a slow positive return to growth in the county, that is also stimulated by implementation of the North West City Region initiative. Phase one will be a period of determined 'intervention' that includes distinctly spatial and plan-led dimensions but will extend beyond the spatial context and include a collaborative partnership response across the public and private sector. Interventions will include setting out and implementing investment priorities in roads infrastructure, water services and energy.

According to the 2016 statistics, the population of County Donegal was 159,192 (an even 50% ratio of male: females), demonstrating a 1.2% decrease between the 2011 and 2016 census[3]. The Western Development Commission (WDC) revealed however, that the population in Donegal has grown by 8% over the past decade.

[2] Donegal County Council. *Planning Map Search* Available online at: http://www.donegalcoco.ie/services/planning/planningapplicationsearch/. [Accessed 20 September 2019]
[3] Western Development Commission (2016) County Donegal Census 2016 dashboard. Available online at: https://www.wdc.ie/county-profiles/donegal/ [Accessed 13 November 2019]

Figure 5.3 illustrates the population density within County Donegal, with darker shading reflecting the areas of higher density. The density pattern reflects the east/west settlement size divide within the county, with the majority of the larger and medium size towns located to the northeast with the smaller towns to the southwest.

The infographic published by the Western Development Commission (WDC) on statistics from the CSO's Census of Population in 2016 shows Letterkenny to be the largest town in Donegal with a population of 19,273. 16% of Donegal's population are aged 65 and over and 22% are under the age of 15. Statistics have also shown that 72.7% of people in Donegal live in rural areas with the average commute to work in the county one of the lowest in Ireland at 22.1 minutes. 57% of Donegal people are said to be in very good health with 33% of adults having a third level qualification.

County Donegal is the fifth most rurally dispersed county in Ireland with 33.8 persons per km^2 compared to a State average of 67 persons per km^2. The county has a predominantly weak urban structure with a large number of small towns, with just nine settlements falling into the aggregate urban area category of over 1,500 inhabitants. There are 61 settlements in County Donegal ranging in size from just over 100 inhabitants to almost 20,000 persons and these settlements are vital in sustaining economic and social vitality and growth in the county. They provide a wide range of services and employment functions which both drive and are supported by their rural hinterlands.

Donegal County can be divided into five municipal districts (MD). The Site is wholly located within the municipal electoral area of Donegal with 880m of the northeast Site Boundary bordering the Northern Ireland, Lifford-Stranorlar local electoral area. The population of Donegal county is almost evenly distributed between Letterkenny MD (25.9%) and Inishowen MD (25.5%). In addition, the population share is similar between Donegal MD (16.7%) and Stranorlar MD (16.2%) while 15.7% reside in the Glenties MD. Letterkenny, Inishowen and Stranorlar all have higher levels of their population over 65 years at 19% and 15% respectively. 50% of the towns in the Donegal MD decreased in size between (2002-2011).

Study Area 3: North and West Region
The draft Regional Spatial and Economic Strategy (RSES) for the Northern and Western Regional Assembly 2040 outlines the reversing of town/village and rural population decline, by encouraging new roles and functions for buildings, streets and sites. The National Planning Framework (NPF) has targeted a population growth of between 160,000 to 180,000, during this period, for the northern and western region with an additional 115,000 jobs required.
RSES notes that the population living in rural towns, villages and the countryside (i.e. other than the cities and regional centres and key towns) are home to almost 80% of our region's population and as such represent a sizeable cohort of the population and an area. Population growth needs to be matched by the delivery of critical enabling infrastructure and services, thus ensuring that these places grow as successful significant employment centres and service locations not only for the urban areas themselves but, importantly, for their extensive hinterlands that include smaller towns, villages and rural areas. The RSES outlines the need to strategically prepare for locally based energy networks enabling locally produced energy to export to the grid and flexible energy consumption.

Study Area 4: Ireland
Ireland has seen a rapid population growth in recent years with improved standard of living and infrastructure growth resulting in a net inflow of the population. The Country has seen a population increase since 1911 from 3,139,688 to 4,588,252 as per the 2011 Census. The most recent census was taken in 2016 and noted a 3.7% increase on the 2011 statistics, bringing the total population count to 4,757,976. Recognising the national economic conditions within which population change occurred over the period 2011-2016, trends considered over a longer-term period demonstrate more measured and sustainable growth patterns.

5.3.2 Economic Activity and Tourism

5.3.2.1 Primary sectors

Study Area 2: Donegal County
Donegal has a strong economy and offers a wide range of business sectors, including manufacturing, healthcare, engineering, food processing and textiles. Economic activities in the Donegal Gaeltacht (1,502 km^2, population 16,000) include information and communications technology, engineering, food processing, audio-visual activities, electronics, marine based natural resources, textiles, internationally traded services, including financial services.

Farming, forestry and fisheries are also three important sectors in County Donegal. The various aspects of the County's food resource offer much potential for farm diversification, creation of rural enterprises, development of rural tourism and

the long-term sustainability of rural communities. Forestry and woodlands present considerable opportunities for the development of sustainable rural areas, providing for increased farm viability through diversification into primary wood production and value-added products whilst also helping to meet the demand for access to rural amenities, activity and adventure tourism. As an island nation, fishing has always been economically and socially important to Ireland with Killybegs one of the most important fishing ports in the country.

The collaborative response to Brexit of Donegal County Council and Derry City & Strabane District Council is being provided through the North West Strategic Growth Partnership and the North West City Region Initiative. Significant work has been undertaken to date to consider the challenges and opportunities that are presented including the publication in February 2017 of a draft report entitled, 'Initial Analysis of the Challengers and Opportunities of Brexit for the Derry City & Strabane and Donegal County Council areas – The North West City Region'. The outputs of this work to date demonstrate that it is imperative to ensure that key, regionally significant growth priorities are realised such as the A5 and A6 roads projects. The enabling role of the County Development Plan (CDP) in identifying, coordinating and prioritising critical infrastructural investment, together with appropriately guiding the location of economic development, is a critical component of economic recovery in County Donegal and has direct links to the priorities set out in the County Donegal Local Economic & Community Plan (LECP) 2016-2022.

The Donegal CDP highlights a role for settlements in driving significant economic development of the County by emphasising the importance of renewal and regeneration of the towns and villages where there are particular niche sectors, enterprise clusters or particular strengths, opportunities or assets that can be harnessed in a balanced manner. In tandem, this Plan aims to strengthen rural communities by supporting agricultural-diversification, tourism and opportunities for rural economic development of an appropriate nature and scale, where local employment opportunities can be provided.

The vision of the CDP provides an alternative to 'Business as Usual' for County Donegal through a range of mechanisms including facilitating improvements in quality of life and wellbeing, encouraging both rural and urban regeneration, identifying and supporting employment potential throughout the county, taking care of our environmental resources and prioritising the development of infrastructure.

5.3.2.2 Tourist Attractions

Study Area 1: Barnesmore and environs (10 km)
There are no tourist attractions pertaining specifically to the site of the Development. The N15 road runs northwards from Donegal town through Barnesmore Gap and the Bluestack mountains and is a popular scenic route in Study Area 1. Map 7.1.1 of the Draft Donegal CDP (12018-2024) outlines scenic amenities for Donegal with notable viewing along the N15 through Barnesmore Gap (outlined in **Chapter 13: Archaeology and Cultural Heritage, Section 13.3.5.3**). Bearnas Mor, the "Big Gap" was created by a glacier, which carved a wide, deep valley in the mountain range. Mountains rise on either side (Croaghconnellagh peak 523 m on west side and Barnesmore peak 451 m on east) for over three kilometres as one drives through the valley. The Lowerymore river runs alongside the N15 before entering Lough Eske. This lake covers an area of 3.6 km^2 and is popular for fishing, especially for spring salmon, sea trout and char from March through to September. Because of its scenic surroundings in the Bluestack mountains (noted on the draft CDP also), this lake and its tributaries are a popular tourist attraction; there are two hotels along its shores and many unassigned forest paths on the southwestern shores of the lake. The lake is located 4.5 km due west of the Operational Barnesmore Windfarm Site Boundary (also identified as good viewing on the Draft Donegal CDP 2018-2024). The lower reaches of the Lowerymore river are part of the Lough Eske and Ardnamona Wood SAC. The N15 roadway has always been of strategic importance as a geographic link between the north and south of the county. The Operational Barnesmore Windfarm is located approximately 2 km east of the N15 road at a significant elevation difference and on the eastern slope of Barnesmore peak.

The social importance of the 'Gap' as a means of transport is pertinent with the road and former railway and electricity cables. The first train through Barnesmore Gap ran on 25 April 1882. The coming of the railway to Donegal opened up a new vista of commercial and social activity in the town and surrounding area. Rail transport became an important element in economic structure of the countryside. County Donegal Railway Restoration Project are advocating to restore a section of track of the Barnesmore Gap railroad. The dismantled railway track is currently located at a distance of 1.9 km due west of the Site Boundary. This distance will not alter with the Development.

The Bluestack Way is a 65 km hiking trail through the mountains with excellent views, as it passes Lough Eske, a riverside walk along Owenea river and through extensive open boglands. The aggregate ascent over the route is 1,430

m. The latter route does not incorporate the Site area but is restricted to the Bluestack mountains located west of the N15 roadway and directed further west to Ardara.

The North-West Cycle Trail is a 326-kilometre circular cycle route running through counties Donegal, Tyrone, Fermanagh, Leitrim and Sligo. The cycle trail follows the N15 through Barnesmore Gap, 2 km west of the Site. The Operational Barnesmore Windfarm is not part of any designated cycling track. Lough Mourne is located 5 km north-northeast of the Site and also runs along the N15 road, north of Barnesmore Gap. This is a scenic lake (location noted on the draft CDP 2018-2024) with Barnesmore mountains reflected in the lough. There is negligible (small brown trout) fishing available here.

There are 119 listed bird guide sites in Donegal, including the Bluestack mountains. Birdwatchers utilise local walkways and trails to gain access to vantage points and lakes, including Lough Derg, located 7.2 km southeast of the Operational Barnesmore Windfarm.

Figure 5.4 outlines scenic amenity categorisation (according to the Donegal CDP 2018-2024) of the Site and its environs. For the most part, the infrastructure and the Operational Barnesmore Windfarm have the lowest scenic categorisation of 'Moderate Scenic Amenity' (MSA), whilst the immediate surrounding landscape, is generally categorised as an area of 'High Scenic Amenity' (HSA). Immediately north of the Site is the southern fringe of a large and contiguous area of 'Especially High Scenic Amenity (EHSA) that is associated with Barnesmore Gap and the Bluestack Mountains. Existing turbine T08 is currently located in this area.

According to the Donegal CDP 2018-2024, areas of MSA are '*primarily landscapes outside Local Area Plan Boundaries and Settlement framework boundaries, that have a unique, rural and generally agricultural quality. These areas have the capacity to absorb additional development that is suitably located, sited and designed subject to compliance with all other objectives and policies of the plan'*.

Adjacent areas of HSA are outlined as '*landscapes of significant aesthetic, cultural, heritage and environmental quality that are unique to their locality and are a fundamental element of the landscape and identity of County Donegal. These areas have the capacity to absorb sensitively located development of scale, design and use that will enable assimilation into the receiving landscape and which does not detract from the quality of the landscape, subject to compliance with all other objectives and policies of the plan'*.

Study Area 2: Donegal County

Whilst it is envisaged that the Wild Atlantic Way ['Signature Points' include Sliabh Liag (45 km west of the Site and had 164,546 visitors in 2017), Fanad Lighthouse (66 km North of the Site) and Malin Head (84 km north of the Site and had 172,329 visitors in 2017)] will be central to the success of the Donegal tourism sector in the coming years, it is also acknowledged that Donegal possesses a wealth of other products and attractions which are making a significant contribution to the tourism sector and have considerable further potential including: festivals and events (e.g. the Earagail Arts Festival and the Donegal Bay and Blue Stacks Festival and other family, music and coastal based festivals and events), hill walking, walking trails and forest walks, cycling, island attractions, golfing, angling, equestrian activities, marine leisure (including surfing, diving, chartered fishing and sailing), rallying, castles and built monuments, (e.g. Donegal Castle, Doe Castle and Beltany Stone Circle) an the Gaeltacht areas.

'Signature Points' (as outlined above) of the Wild Atlantic Way are all >40 km from the Site. Donegal County possesses 21% of the 'Discovery Points' along the 2,500 km stretch of the Wild Atlantic Way. Two Discovery Points are within a 20 km radius, and include Murvagh beach, a long sandy Blue Flag beach located 8.3 km due south-west and Mountcharles Pier, another south-west coastal point, located at a distance of 19.7 km. The majority of the Discovery Points along the Wild Atlantic Way in Donegal are coastal and located over 50 km from the Site.

There are several tourism attractions clustered around Donegal Town (over 10 km southwest of the Site) that include the famine graveyard, a Church of Ireland church built 1828, the 15th century Donegal castle, Donegal railway heritage centre, Donegal Bay waterbus, the Franciscan Abbey and the fairy bank walk. Revenue from tourism is hugely important for the county, with overseas visitors (255,000) spending €82 million in 2017 and domestic visitors (376,000) €96 million.

In addition to the above-mentioned existing products and attractions, the DCC acknowledges the immense potential of Donegal's old railways lines and other potential linkages to act as Greenways for walking and cycling tourism. Donegal Council will therefore continue to protect the routes of such potential greenways through the policies of the CDP and will

actively work with all stakeholders to facilitate the development of Greenways and walking and cycling routes throughout the County.

Objective **TOU-O-7** of the Donegal CDP 2018-2024 is '*to continue to manage development in a manner which supports and sustains the Wild Atlantic Way Tourism initiative'*. Objective **TOU-O-2** is '*to protect and enhance Donegal's landscape and natural environment as a fundamental resource which underpins the county's tourism product'*.

5.3.2.3 Tourism: Numbers and Revenue

Study Area 2: Donegal County
According to Fáilte Ireland (2018) Donegal had 283,000 tourists in 2016 (data based on a three-year rolling average), with an estimated overseas tourist revenue of €90 million for the county. Local Irish resident trips to the county was 374,000 in 2016, with an expenditure of €99.9 million.

5.3.2.4 Visitors Attitude on Windfarms

The first windfarm in Ireland was completed in 1992 at Bellacorrick, Co. Mayo and since then windfarms have elicited a range of reactions from Irish people. In 2002, Sustainable Energy Ireland (SEI) [now the Sustainable Energy Authority of Ireland (SEAI)] commissioned a survey aimed at identifying public attitudes to renewable energy, including wind energy in Ireland. The 2002 survey found that, in general, Irish people are positively disposed towards the development of windfarms. However, the survey also indicated that people will not accept windfarms everywhere and that special care should be taken to ensure that win farms respond to contextual landscape characteristics.

Ireland's scenery has been a cornerstone of international tourism marketing campaigns for decades. In 2012, 91% of overseas holidaymakers to Ireland rated scenery as an important part of a destination with natural/unspoilt environment also rated highly at 91%. The future sustainability of Ireland's tourism industry is, therefore, inextricably linked to the maintenance of the character and scenic qualities of the Irish landscape.

Fáilte Ireland, in association with the Northern Ireland Tourist Board (NITB) decided in 2007 (67 windfarms established) to survey both domestic and overseas holidaymakers to Ireland to determine their attitudes to windfarms. The survey drew on many aspects of the original SEI survey including the photomontages of windfarms, and in particular, the landscape types that were used to elicit a reaction from respondents. The purpose of the survey was to assess whether or not the development of windfarms would impact on the visitors' enjoyment of Irish scenery. In 2012, this research was updated by Millward Browne Landsdowne on behalf of Fáilte Ireland to determine if there was any change in visitor attitudes during this period.

The 2007 research found that the majority of visitors felt that windfarms had either no impact (49%) or a positive impact (32%) on the landscape, whilst 17% felt they had a negative impact. The 2012 research indicated an increase in the polarisation of opinion – with increased positive (47%) and negative responses (30%) and less neutral responses (23%). It was notable that those interviewed who did not see a windfarm during their trip held more negative perceptions and opinions on windfarms to those that did. Of the windfarms viewed the majority (59%) contained less than ten turbines, which was quite similar to 2007 (63%).

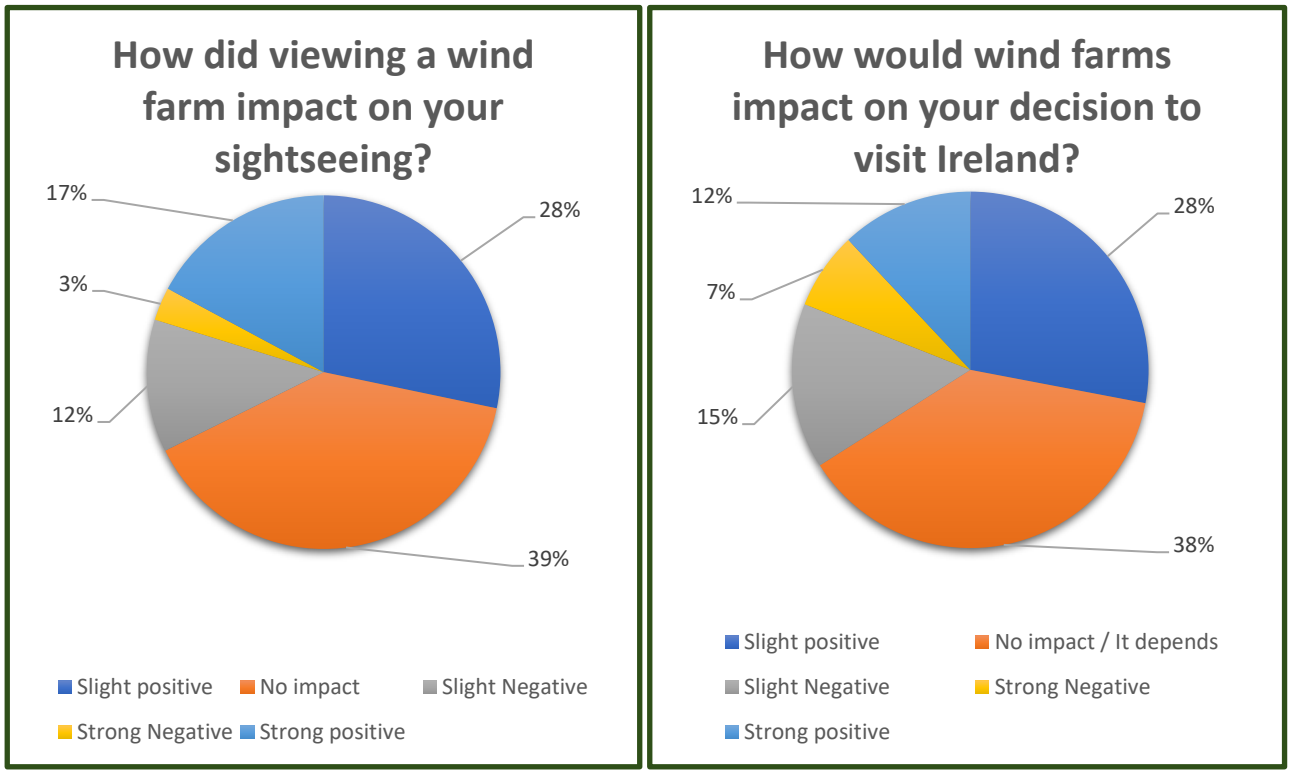
Despite the fact that there has been an increase in the number of visitors who have seen at least one windfarm on their holiday, there was also a slight increase (from 45% in 2007 to 48%) in the number of visitors who felt that this had no impact on their sight-seeing experience. Importantly, and as has been seen in the previous research, the type of landscape in which a windfarm is sited can have a significant impact on attitudes. Although 21% feel that windfarms have a fairly or very negative impact on sight-seeing, this figure increases substantially for windfarms in coastal areas (36%).

Visitors were again asked to rate the beauty of five different yet typical Irish landscapes: coastal, mountain, farmland, bogland and urban industrial land, and then rate the scenic beauty of each landscape and the potential impact of siting a windfarm in each landscape. As in 2012, the results indicate that each potential windfarm and site must be assessed on its own merits, due to the scenic value placed on certain landscapes by the visitor and the preferred scale/ number of wind turbines within a windfarm. Looking across all landscapes, windfarms are seen to have an enhancing effect on the landscapes seen as less beautiful, particularly urban/ industrial and bogland.

Coastal areas (91%) followed by mountain moorland (83%) and fertile farmland (81%) continue to be rated as the most scenic, and unsurprisingly resistance is greatest to windfarms in these areas. For instance, there was a greater relative

negativity expressed about potential windfarms on coastal landscapes (40%), followed by fertile farmland (37%) and mountain moorland (35%). On the other hand, less than one in four were negatively disposed to the construction on bogland (24%) or urban industrial land (21%). The majority of visitors also still favour large turbines (47%) over small turbines (28%), and in smaller numbers, with the option of five turbines proving the most popular, followed by two clusters of ten and finally windfarms of 25 turbines.

Seven out of ten (or 71%) visitors claim that potentially greater numbers of windfarms in Ireland over the next few years would have either no impact or a positive impact on their likelihood to visit Ireland (**Graph 5.1**). Of those who feel that the potentially greater number of windfarms would impact positively on future visits, the key driver is support for renewable energy, followed by potential decreased carbon emissions. Given the scenario where more windfarms will be built in Ireland in the future, the most widely held view is that this will not impact their likelihood to visit the area again, with a slightly greater majority saying that this would have a positive rather than a negative impact.



Graph 5.1: Visitors Attitudes on the Environment – Windfarms. Source: Fáilte Ireland (2008)

Fáilte Ireland carried out research on Overseas Holidaymakers Attitudes to Ireland in 2018 and noted holiday makers choice is based largely on *beautiful scenery* (93%), followed closely by *plenty to do and see* (91%) and *friendly people* and *natural attractions* (88%). BiGGAR Economics carried out research in Scotland on 28 windfarms and tourism trends (2017)[4]. No pattern emerged that would suggest that onshore windfarm development has had a detrimental impact on the tourism sector, even at a very local level and no relationship between the development of onshore windfarms and tourism employment at the level of the Scottish economy, at local authority level nor in the areas immediately surrounding windfarm development.

5.3.3 Employment: Study Area 2

According to the Donegal Local Economic and Community Plan 2016-2022, Volume 1, one of the weaknesses experienced in Donegal is 'high unemployment level and high youth unemployment' and 'limited economic base/employment base'. In 2016, 71,182 people were in employment in Co. Donegal, i.e. a labour force participation rate of 57.3%, notably below the national average of 61.9% (**Diagram 5.1**). These people in Donegal's labour force represent a 1.3% decline on the 2011 figure (compared with 3.2% growth nationally). Donegal is one of only six counties where the labour force shrank. Just 47% of the county's adults are 'at work', well below the 53.4% national average.

[4] BiGGAR (2017) Wind Farms and Tourism Trends in Scotland. Available online at: https://www.lyrewindfarm.com/web/cms/mediablob/en/3949334/data/3878350/2/windfarm-lyre/Wind-farms-and-tourism-trends-in-Scotland.pdf [Accessed on 13 November 2019]

The share unemployed is considerably above average (10.3% v 7.9%) and second highest in the State. The county has a similar share of self-employment (employer/own account worker) as nationally.

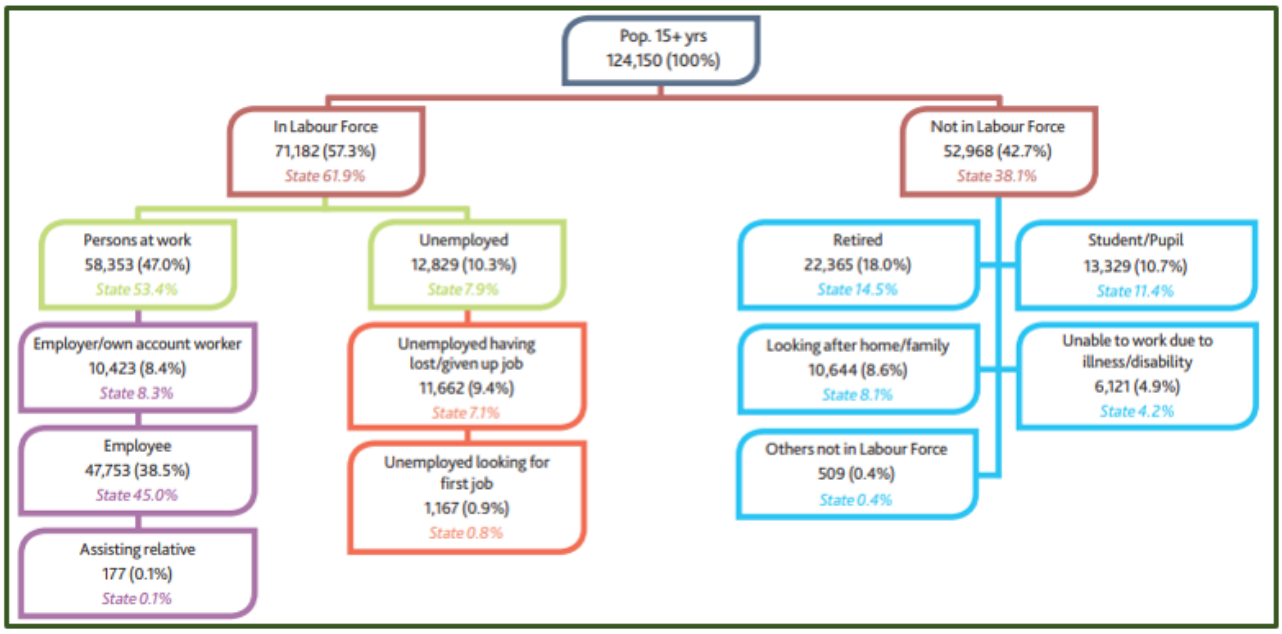
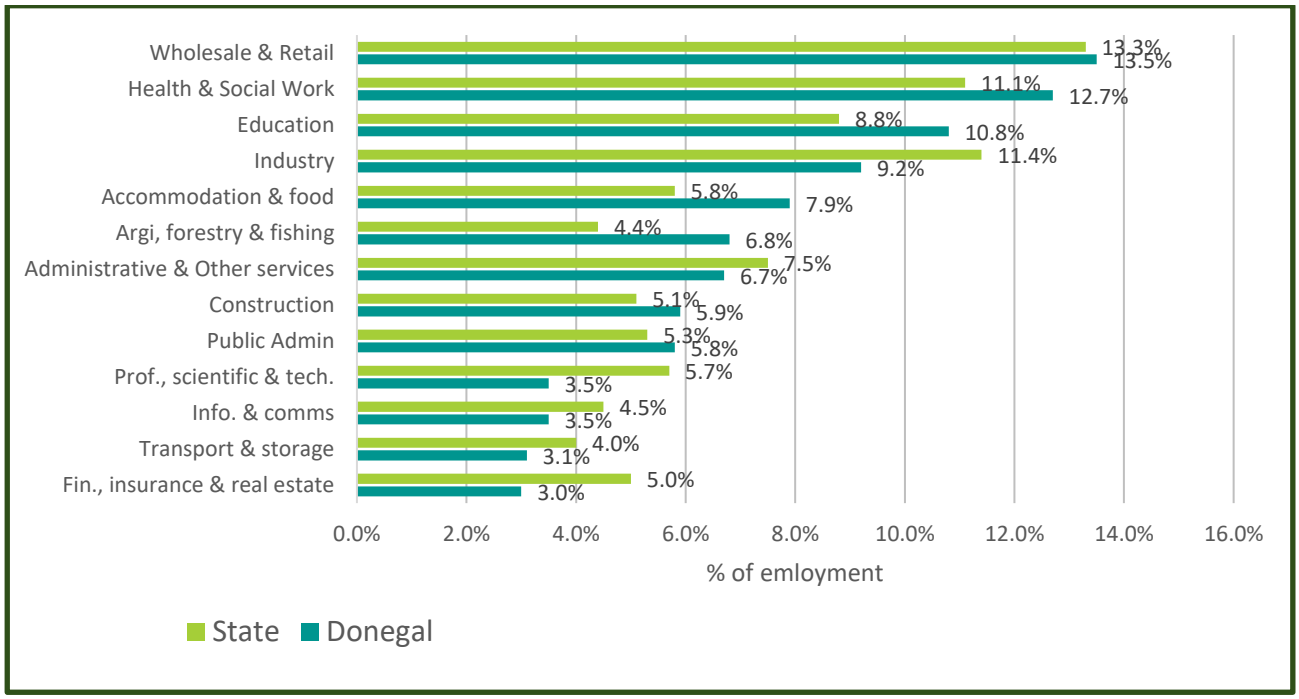


Diagram 5.1: Population of County Donegal aged 15 years and over by principal and labour force status, 2016 Source: Western Development Commission Insights (October 2017)[5]

The share of Donegal's adults who are outside the labour force (42.7%) is substantially above the national average (38.1%). 'Retired' is the largest group and accounts for a considerably higher share than nationally (18% v 14.5%). Donegal also has a higher share unable to work due to disability/illness, however its share of students/pupils is below the national average; 10.7% compared with 11.4%, despite the presence of a third level institution.



Graph 5.2: Percentage of total employment in each broad sector in County Donegal and State, 2016. Source: Western Development Commission Insights (October 2017)[5]

[5] Western Development Commission Insights (2017) *Providing Insights on Key Issues for the Western Region of Ireland*. Available online at: https://www.wdc.ie/wp-content/uploads/WDC-Insights-County-Donegals-Labour-Market-Census-2016-Oct-17.pdf [Accessed on 13 November 2019]

Donegal's three largest employment sectors (1: Wholesale and retail, 2. Health and social work and 3. Education) are all more important to the county than elsewhere in Ireland (**Graph 5.2**). However, Wholesale & Retail only grew 0.9% in Donegal since 2011, about half the 1.7% national growth. In contrast, both Health and Education grew quite strongly, up 12.7% and 7.1% respectively since 2011. While Education performed better than State average growth (5.7%), the growth of Health employment was slightly below average (13.4%). Accommodation & Food service and Agriculture are also substantially more important to Donegal's labour market than nationally. In fact, Donegal has the third highest share of employment in Accommodation & Food service in the State and the sector performed very strongly since 2011; growing 19.9% compared with 12.9% national growth, perhaps linked to the Wild Atlantic Way initiative.

Donegal has one of Ireland's richest marine resources including 1,134 km of coastline (17% of the State's), 13 blue flag beaches, deep natural harbours, rich coastal areas, coastal communities and inhabited islands. This marine resource has allowed the fishing sector to thrive and is of major importance to tourism and leisure activities. The contribution of the fishing sector to the Donegal economy remains strong despite restructuring and quota restrictions. The marine sector in Donegal employs approximately 3,200 full and part time people in fishing/farming, processing and service activities. In particular, Killybegs (with €92 m of landings) and Greencastle (with €69m of landings) are the 2nd and 8th largest fishing ports in the country, in terms of overall fish landings in 2015. Killybegs, Greencastle and Burtonport are important centres for fishing and fleet activity and act as vital economic catalysts for their respective local economies.

Killybegs also operates as a general cargo facility and successfully completed the unloading and lay down of 18 wind turbine tower sections from one of the largest cargo vessels ever to berth at the port. The future vision of Killybegs is to continue to develop its commercial cargo port and maintain facilities to support on-shore energy projects with cranage capacity of 120 tonnes and support services of tugs, mobile cranes, synchro-lifting, marine engineering, electronics and ship repairs. As part of the Project Ireland 2040, The Minister for Agriculture, Food and the Marine has recently announced (August 2019) the signing of a €14.7 million capital works contract to deliver a 120 m long quay development and associated works at Killybegs Fishery Harbour Centre. The Minister has said he viewed this project as a "*commitment to the social and economic development of rural coastal communities"* and noted how *"Killybegs has become the port of choice for the importation of wind turbines. The expanded landing facilities and increased quay space will provide further opportunities for greater economic diversification."*

Donegal County also has a well-established and successful, added value fisheries sector which includes onshore processing, packaging and the development of fish meal products. In addition, the County has a diverse range of onshore industries supporting the marine sector including, boat building, net manufacture/repair, haulage and logistics, marine winches, hydraulics, pumps, electronics etc.

The county has a strong aquaculture sector (e.g. salmon, oyster and mussel farming) providing considerable local employment both onshore and offshore for coastal communities around the Donegal Coastline. The Council plans to support the sustainable development of onshore/ancillary aquaculture developments to maximise the potential of the sector in terms of employment and product export.

Approximately 38% of the total county area is in agricultural use, although much of it is unsuitable for commercially intensive farming. Most farming and forestry activities are outside the scope of planning control, but emerging diversification opportunities with horse riding, angling, sailing, surfing, walking, cycling and eco-tourism all have the potential to attract visitors from both home and overseas and create supporting jobs. Organic and value-added food production and agri-tourism also have potential for job creation.

While construction during the period 2011-2016 experienced lower than average growth (9.3% v 16.6%), it remains a more important employer for Donegal than elsewhere. Public Administration also proved to be an important employer in Donegal, though it experienced Donegal's largest employment decline and performed worse than nationally; declining to 14.2% compared with a 6.3% decline.

Unlike other Western Region counties, Industry is substantially less important in Donegal than nationally and it experienced below average growth since 2011 (7.9% v 9.4%). Knowledge intensive services (Professional, Scientific & Technical activities, Financial, Insurance & Real Estate and Information & Communications) also employ a lower share in Donegal. However, Information & Communications enjoyed the county's strongest employment growth, increasing by 39%, above the 31.4% national growth.

Professional services also performed well (up 18.5%), though somewhat below the State average (22.2%). Financial services in contrast saw employment decline by 9% compared with a 1.3% decline nationally. This is linked to closures of local bank and insurance branches.

Letterkenny Institute of Technology (LYIT) has been working with European partners to research the potential for harmonisation of education for the offshore wind sector. In September 2019, a workshop was held on *Mapping the Future of Offshore Wind Education in the EU*. With the ongoing development of wind energy in Donegal county, LYIT now has a Wind Energy Centre located at Killybegs and has an alliance with Safety Technology Limited making Killybegs a centre of excellence for Wind Energy Training for the industry. LYIT is the only college in Ireland with a Wind Turbine Training Tower. According to the Manager of the Wind Energy Centre "*The alliance with Safety Technology Ltd will increase the employability of these graduates since it will include Global Wind Organisation and Renewable UK approved safety training and certification for their safety modules. Our graduates will leave us not only with a LYIT Minor Award in Wind Energy Technology, but also a BZEE Award and RUK/GWO certification in Working at Heights and Rescue, First Aid, Manual Handling and Fire Awareness. These certifications will no doubt increase their employability skills*".

Regional Planning Guidelines (RPG) (2010-2022) consider the assets of the Region in terms of the sectoral opportunities and identify the existing and potential elements for future economic growth. They include tourism, knowledge-based services, renewable energy/green economy, agri-food sector, and environmental products and services. The RPG's also identify Donegal's natural resource base (including added value agriculture, forestry and aquaculture) creative culture (design, digital media, crafts and visual arts) and the retail sector, in key centres, as significant elements for consideration.

The CDP 2018-2024 section on Rural Areas noted that '*renewable energy enterprises also have the potential to contribute to employment generation and the economy of Donegal*'.

5.3.4 Land Use and Topography: Study Area 2

County Donegal is located in the Border Region and is bounded on the southwest, west and north by the Atlantic Ocean and on the east by counties Derry, Tyrone, Fermanagh and Leitrim. County Donegal shares 93% of its entire land boundary with Northern Ireland and the remaining 7% (or 9 km stretch) is with County Leitrim at its most southerly point. County Donegal is the fourth largest County in the State with a land mass of 4,764 km^2 or 6.9% of the total land area of the State. The landscape of Donegal is varied and dramatic, comprising of mountains, valleys, and fertile plains with a deeply indented coastline forming natural sea loughs, bays, peninsulas and many islands both inhabited and uninhabited.

According to the Landscape Character Assessment (LCA) for Donegal, the Development is located within the Croaghnameal Border and Uplands LCA 41. This LCA is outlined as a remote area of primarily upland mountainous blanket bog and mountain lakes with significant areas of commercial forestry, particularly along the eastern boundary with Northern Ireland. The northern part of the LCA forms half of the iconic 'Barnesmore Gap', a steep sided and wide river valley through which the N15 and the old Donegal Railway line runs, and one of the main vehicular routes into Donegal from the south. The characteristics of this landscape are:

- Upland rolling mountainous landscape
- Mostly covered by blanket bog with isolated lakes, streams flowing west towards Donegal Bay and Lough Derg.

The location of the Operational Barnesmore Windfarm is within a specific landscape character type '*300 m^+ Highland Blanket Bog'*, covering a continuous area (apart from isolated lakes and watercourses) of approximately 482 ha. Other separate areas of '300 m^+ highland blanket bog' are located further south within the LCA.

The Site is situated on relatively high ground, with turbines at elevations ranging between c. 294 m and 381 m above Ordnance Datum. The highest point of the Site is located at the north-western side of the windfarm in the townland of Keadew Upper, with an elevation of 381 m OD.

The Site is within the electoral area of Clogher (35.7 km^2) which supports 63 farm holdings (**Table 5.2**); 59% are greater than 10 ha. 49% of the Clogher area is farmed under pasture and 22% under rough grazing. The main livestock farmed are sheep.

Table 5.2: Agricultural statistics for the electoral division of Clogher, Co. Donegal (CSO 2016)

Electoral Division	Number of Farms	No. of farms <10ha (%)	No. of farms >10ha (%)	Area farmed under pasture/total area farmed (ha)	Area farmed under rough grazing/total area farmed (ha)	Area farmed under silage/total area farmed (ha)	No. of livestock (Sheep/Cattle)	Farm labour input by number of persons
Clogher	63	24 (41%)	39 (59%)	956/1,962 (49%)	441/1,962 (22%)	253/1,962 (13%)	4,011 / 1,840	97

5.4 Assessment of Potential Impacts

5.4.1 Accidents / Disasters (incorporating Health and Safety)

The duties on designers and manufacturers of machinery including wind turbines are set out in the Machinery Directive, which has been transposed into national law by the 2008 European Communities (Machinery) Regulations as amended[6]. Properly designed and maintained wind turbines and associated infrastructure are a safe technology. The Barnesmore Project Safety and Health Plan outlines the Co-ordination of Ongoing Design and Management of Design Change that includes principles of prevention. A suitable separation distance from turbines and other key infrastructure to properties has been embedded in the Development design. These outlined measures will minimise the risk to humans. Overall impacts associated with weather, including extreme winds, lightning strikes, ice-throws, heat waves and structural failure have been removed or reduced through inbuilt turbine mechanisms in modern machinery and have been scoped out of the assessment. Potential health impacts are therefore related to decommissioning/construction related impacts and operational impacts on residential amenity.

There are no areas mapped as being of low, medium or high probability flood areas within or directly down-gradient of the Site (**Chapter 9: Hydrology and Hydrogeology**, **Section 9.3.8**). The net increase in surface water runoff relative to the scale of the Site (conservative) as a product of the Development is 0.05%; this is considered as imperceptible, and therefore any potential risk of increased flood risk arising as a product of the Development is considered imperceptible.

In relation to earthquakes, Donegal is situated along the boundary of a collision between two ancient continents. On 7 April 2019 at 23:58:19 local time, an earthquake of magnitude 2.4 occurred in Donegal Bay (over 30 km from the Site Boundary) and at a depth of four km. The location of the epicentre was 54.53N, 8.62W. The event was felt widely by members of the public around the Killybegs area[7]. On 29 April 2019 at 21:18:23 local time, a further earthquake of lower magnitude 2.1 occurred in Donegal. The location of the epicentre was 54.56N, 7.96W, approximately 19 km south-west of the Site Boundary. Both earthquakes were detected automatically by the Irish National Seismic Network (INSN). There are several fault lines across Donegal; the Site however, is not located along a fault line and there is no historical record of any earthquake causing serious damage in County Donegal, the surrounding counties or on the island of Ireland.

An Energy Storage Unit will be located onsite, with a capacity for up to 15 MW storage. The final selection of energy storage technology used will be based on the latest technology available at the time of construction, and it is requested that final details of this ancillary element be secured via the use of an appropriately worded planning condition. Lithium reacts with water, forming lithium hydroxide and is a highly flammable hydrogen. All units will have a Stat-X fire suppression generator as a principal line of defence against a fire. This is a potassium-based suppressant whereby the aerosol remains in suspension for up to an hour providing extended post-fire security against re-ignition[8].

Practical steps will be undertaken to ensure the safe installation, construction and operation of this facility.

[6] European Communities (Machinery) Regulations (2008) Statutory Instrument (S.I.) No. 407 of 2008 as amended by S.I. 310 of 2011 and S.I. 621 of 2015.
[7] Irish national Seismic network (2019) Recent Earthquakes. Available online at: https://www.insn.ie/recent-local-earthquakes/ [Accessed on 12 November 2019]
[8] Nobel Fire Systems (2019) Battery Energy Storage System Fire Protection. Available at: https://nobel-fire-systems.com/battery-energy-storage-systems-bess/ [Accessed on 13 November 2019]

As outlined in Section 5.1.1, considerations have been given to the interactions with various impacts assessed in other chapters of this EIAR. In brief, these findings are outlined in **Table 5.3**.

Table 5.3: Summary of Impacts as a result of the Development

Environmental Aspect	Assessment of Impact Generated
Hydrology	*If precautionary and mitigation measures described in this report are implemented, concentrations of suspended solids can be reduced to acceptable levels prior to runoff being intercepted by the surface water network associated with the Site*. *No new impacts are anticipated during the Operational phase of the Development.* (**Chapter 9: Hydrology and Hydrogeology, Section 9.7**).
Noise	Human health in relation to noise is protected by the EHO/WHO noise limits[9]. *An assessment was made of the cumulative effects which was found to be in compliance with 2006 Guidelines and the Preferred Draft Approach 2017. Noise levels during Operation have been predicted and also found to be compliant.* *Noise during decommissioning of the Operational Barnesmore Windfarm and construction of the proposed windfarm will be managed to comply with best practice, legislation and guidelines current at that time, so that effects are not significant.* (**Chapter 10: Noise, Section 10.7**).
Shadow Flicker	*This assessment has identified no significant effects, given that shadow flicker is unlikely to cause a nuisance to nearby inhabited dwellings which are greater than ten rotor diameters from the turbines. The potential effects of the Development from shadow flicker are considered to be '**Not Significant'**.* (**Chapter 12: Material Assets and Other Issues**, **Section 12.8**).
Air and Climate	*The cumulative effect of the Development with other Irish renewable generation is considered to be a fundamental change in the climate effects of Ireland's energy supply, which is a **major, positive effect,** that is significant under the EIA Regulations and will contribute to Ireland's binding emission reduction targets.* *The potential effects of the Development on air quality and climate are considered '**Not Significant'** (**Chapter 12: Material Assets and Other Issues, Section 12.7**).*
Traffic and Transport	*The potential effects of the Development on traffic and transport are considered to be '**Not Significant'** (**Chapter 14: Traffic and Transport, Section 14.10**).*
Landscape and Visual Amenity	*Based on the findings of the collective assessments it is not considered that the Development will give rise to any significant effects* (**Chapter 11: Landscape and Visual Amenity, Section 11.7**).

With mitigation measures in place, it is considered unlikely that the impacts on population and human health (from a pollution perspective, environmental hazards or visual amenity) would be significant and can be ruled out and are therefore not discussed further in this chapter.

5.4.2 Potential Impacts on Population and Settlement Patterns

The Development does not contain a housing or services element and is not considered to have any direct positive or negative impact on the local or regional population levels. However, employees who are not based in the region may temporarily relocate, this is more likely for the initial construction and decommissioning phase than for the operational phase. The overall impact is considered to be **imperceptible** in terms of population.

[9] World Health Organisation (2018) Environmental Noise Guidelines for the European Region, Available at: http://www.euro.who.int/__data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf?ua=1 [Accessed 12 November 2019]

The predicted effect on the immediate settlement patterns and social patterns is also **slight to non-existent**. There is however, the possible benefit which would accrue to the region in terms of the ability to provide electricity to industry and business in a high-quality supply. This will lead to the region becoming more attractive to business with the subsequent benefit of increased employment opportunities in the region. A renewable, green energy supply could potentially be attractive for companies looking to develop in County Donegal and be located in the vicinity of the Site.

While this is not likely to result in a marked increase in settlement in the area, or a change in social patterns in the area, it should provide a positive influence to help reduce the population drain out of the Donegal area, should the provision of a secure, renewable energy source prove attractive to industry. This is dependent on national and global economic conditions, as well as the types of industry which may locate in the region.

The overall impact during the initial decommissioning and construction phase is predicted to be **slight positive and short-term** in nature should workers relocate to the area for the duration of these phases. The overall impact is predicted to be **slight positive** at the local level in terms of settlement patterns where increased business is attracted to the area during the operational phase.

5.4.3 Economic Activity and Tourism

5.4.3.1 Economic Activity

During the 12-month initial decommissioning and construction phase, there would be economic effects resulting from the expenditure on items such as Site preparation, Site Access Tracks, purchase and delivery of materials, plant, equipment and components. Information provided by the Applicant on experience at other windfarms indicates that there is expected to be a peak onsite workforce of 50-60 workers. Some of these workers would be sourced from the local labour market in Study Area 2, but professional and skilled personnel may be required to be sourced from areas inclusive of Study Area 4 or even further afield.

During the initial decommissioning and construction phase, jobs are likely to be created. Local employment will be provided, as well as employment on local, national and international levels both directly and indirectly. Throughout the project lifetime, employment will be both created and maintained on local, regional, national and international levels.

It is envisaged that labour and materials will be sourced from the local area during construction where possible. Any rock needed will likely be sourced from a local quarry, subject to quality and quantity being available and subject to the quarry operator holding all necessary authorisations. Meenadreen extension Windfarm, located 1.4 km south of the Operational Barnesmore Windfarm, was fully supplied by local quarries. Ready-mix concrete will also be sourced from a local supplier, again subject to authorisation, and to quality and quantity being available.

Employees involved in the initial decommissioning of the Operational Barnesmore Windfarm and construction of the Development will most likely use local shops, restaurants and hotels/accommodation. Therefore, overall there will be a **slight, positive impact** on employment in the area. Employees also involved in the subsequent operation of the Development will use local shops, restaurants and hotels/accommodation.

BVG Associates carried out extensive assessments on the economic benefits from eight SPR onshore windfarms in Southwest Scotland[10]. Each contract value was assigned to one or more relevant elements of a supply chain. Capital expenditure (CAPEX) was found to relate to turbine, civil works and electrical works supply chains, whereas the operational expenditure (OPEX) relates to transmission operations, Maintenance and Service (OMS) supply chain, the windfarm OMS and also the decommissioning supply chain.

Based on this research and the largest capacity being installed, the CAPEX for the Development is estimated to be approximately €90 million. This expenditure will result in economic benefit at a national, regional and local level. The OPEX (based on a conservative 24-year period) in nominal terms is estimated to be €105 million. The BVG report found, for the eight projects studied, that 66% of the total project spend (CAPEX & OPEX) was retained within the National economy, 17% of the total was retained in the local region hosting the project.

Donegal County Council will benefit from payments under both the Development Contribution Scheme and from the annual rate payments. The Applicant is also committed to a 'Community Benefit' package. This package will be advertised annually and managed by the local community or an independent body by the local community. The purpose

[10] BVG Associates (2017) Economic benefits from onshore wind farms Available online at: https://bvgassociates.com/wp-content/uploads/2017/09/BVGA-18510-Economic-impact-onshore-wind-report-r3.pdf [Accessed on 28 November 2019]

of the community fund is to enable the local community to share in the benefits of the Development. SPR community benefits funds typically support local projects, with funds allocated to projects from all aspects of the community.

During the operational phase, the land value would increase as a result of the Development, resulting in a minor beneficial effect on land use within the Site.

The overall impact is predicted to be a **moderate, positive, short-term** impact during the initial decommissioning and construction phase of the Development and **moderate, positive and long-term** during the operational phase.

5.4.3.2 Tourism

The Development will not interfere with access to any of the three 'Signature' or 36 'Discovery Points' of the Wild Atlantic Way in Donegal. The majority of these points are coastal, whilst this windfarm is over 10 km inland. There are no designated routes for hillwalkers or other amenity facilities within the Site.

Fáilte Ireland published guidelines in 2011 for the treatment of tourism in an EIS, which describes the effects of projects on tourism. Many of the issues covered in the report are similar to those covered in this EIAR, for example, scenery is assessed in **Chapter 11: Landscape and Visual Amenity**.

Currently, the nearest turbine (T1 of the Operational Barnesmore Windfarm) to the N15 is on the eastern downslope side of Barnesmore peak and at a distance of 1.94 km from the N15 road. The national road is located 1.44 km from the Applicant's Site Boundary. The proposed new layout of turbines will marginally increase the distance of the nearest turbine to 2.12 km to the road, but the Site Boundary distance from the N15 will be maintained.

The Operational Barnesmore Windfarm currently stretches for 1.12 km over a northeast to southwest bearing, from turbine T3 to T16 and over 1.31 km over a north-west to south-east bearing (T8 to T25). New repowering turbines will replace T3 and T16 (repower numbering T6 and T1 respectively), maintaining the northeast to southwest stretch of 1.31 km. The north-west / south-east extent of the Development will be increased to 2.37 km as a new turbine T13, will be located along the existing roadway (**Figure 1.4 b**). This turbine will be located at the furthest point from the N15 road, at a distance of 3.10 km and at the lowest elevation of 294 m.

Neither the existing or repower turbines are visible from within the Gap, although both existing and proposed are visible on the northern approach. **Chapter 11: Landscape and Visual Amenity** outlines and deals specifically with Landscape and Visual Amenity (a conclusive summary is given in **Table 5.3** above).

The Operational Barnesmore Windfarm Site Boundary is located at a distance of 1.9 km (at the nearest point) from the dismantled Barnesmore Gap railroad. This distance will be maintained by the Development. All noted popular /designated walkways noted in Section 5.3.2, greenways and cycling routes are located outside of the Site Boundary. These courses will not be impacted by any decommissioning, construction or operational work during the repowering process.

Fáilte Ireland published a study on 'Visitor Attitudes on the Environment' in 2012[11] to assess the perceived impacts of windfarms on potential future visits to an area. The study found that 12% of those surveyed, responded that windfarms would have 'a strong positive impact' on their decision to visit Ireland, with 27% responding it would have a 'slight positive impact', whilst 38% said it would have 'no impact'. 7% of respondents stated it would have a 'strong negative impact' and 15% stated it would have a 'slight negative impact'. The survey also found that windfarms were noted as more favourable than other forms of development such as housing, mobile phone masts or electricity pylons.

Based on historical examples and findings of the BiGGAR Economics report (mentioned in Section 5.3.2) and taking this repowering windfarm into consideration, there is not expected to be any direct relationship between the tourism sector growth and this Development.

The baseline Scenic Amenity Designation (according to the Donegal CDP 2018-2024) for the existing windfarm was outlined in Section 5.3.2.2 above. The Development will have five new turbine foundations (T4, T10, T11, T12 and T13) along the existing Site Access Tracks which will extend into MSA areas. All remaining turbine foundations will use the

[11] Fáilte Ireland (2008) Visitors Attitudes on the Environment – Wind Farms. Available online at: http://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/4_Visitor_Insights/Visitor-Attitudes-on-the-Environment.pdf?ext=.pdf [Accessed on 13 November 2019]

existing footprint of the current windfarm, including T5 which is located in the EHSA area. **Chapter 11: Landscape and Visual Amenity** assesses the landscape effects, the visual effects and the cumulative effects of the Development and the Residential Visual Amenity. Based on the findings of the collective assessments, it was considered that the Development will not give rise to any significant effects.

The local community are known to avail of, and value, the Operational Barnesmore Windfarm Site Access Tracks for recreational purposes, with the added gain of a wonderful panoramic view from the higher altitude and modified, easier access to Barnesmore peak. These tracks will remain in situ with a further extension of similar tracks that will encourage and benefit walkers with increased track length for walking, in otherwise difficult terrain. This is an amenity benefit that will continue during the operation of the Development. Overall effects of the Development with regards to tourism are considered to be **imperceptible** during both construction and operation with a **slight positive** impact during operation.

5.4.4 Employment

The CDP 2018-2024 noted that '*County Donegal is ideally situated on the North-West Atlantic coast to take advantage of its sources of renewable energies, and the associated significant employment and economic opportunities arising as a result'*.

The employment effects that are attributable to the Development can be outlined as direct, indirect and induced.

Direct: Employment and other economic outputs that are directly attributable to the delivery of the Development. These include any new jobs that are created to manage and supervise the initial decommissioning and construction phase and operational phases of the Development and that are filled by employees of the Applicant or the appointed Contractor (or sub-contracted employees).

Indirect: Employment and other outputs created in other companies and organisations that provide services to the Development (i.e. procurement and other supply chain effects). Most manufactured materials like towers, blades and subcomponents are assumed to be imported (import intensity of 66%) with major infrastructure delivery through Killybegs harbour; fewer indirect manufacturing jobs will be generated domestically in Ireland.

Induced: Additional jobs and other economic outputs that are created in the wider economy, as a result of the spreading employee incomes and other ripple effects that occur as a result of the direct and indirect effects of the Development.

Sustainable Energy Authority of Ireland (SEAI) researched the flow of investment and sales revenue from onshore wind and the transmission grid through the different industrial sectors in the supply chain required for input–output macro-analysis[12] (**Table 5.4**).

Table 5.4: Capital Investment breakdown for onshore wind supply (Source SEAI, 2015)

	Industrial Sectors
€192 million average annual capital investment to reach 2020 NREAP/NEEAP targets	Manufacturing (70%): turbines, blades, towers, gearbox, generator, electrical equipment, transformer etc.
	Construction (12%)
	Electricity Supply Services (10%)
	Transport (2.5%)
	Finance (2.5%)
	Professional Services (3%)

Note: NREAP/NEEAP = National Energy Efficiency and Renewable Energy Action Plans

In terms of its capacity to capture capital investment domestically, Ireland has strong indigenous feasibility, planning, foundations and engineering expertise, with the skills and knowledge base to potentially supply niche markets in controls and instrumentation, albeit the bulk of heavy manufacturing (blades, towers) is imported at present. Similarly, the Irish

[12] Sustainable Energy Authority of Ireland (2015) A Macroeconomic Analysis of Onshore Wind Deployment to 2020 Available online at: https://www.seai.ie/publications/A-Macroeconomic-Analysis-of-Onshore-Wind-Deployment-to-2020.pdf [Accessed 29 November 2019]

supply chain is very well positioned in all of the preliminary design and operational aspects of the electricity grid, providing a significant boost to local employment. However, some manufactured materials such as cables, underground pipes, insulators and conductors are sourced from abroad. According to SEAI13 there are approximately 0.34 new long-term jobs per MW, which falls in line with European Wind Energy Association (EWEA) estimates for direct employment in Europe. In the case of the Development, this translates to 26 for a 75.4 MW powered installation.

The Development will create the most employment during the initial decommissioning and construction phase.

It is estimated that 50-60 construction workers (not at the same time) will be employed directly during this phase. An estimated breakdown of the potential construction employment is as follows:

Table 5.5: Estimated Employment breakdown during the initial decommissioning and construction phase of the Development

Occupation/Task	No. of People (Employment Period)
Foundation team	eight (20 weeks)
Roads (truck drivers)	eight (40 weeks)
Plant drivers	four (60 weeks)
Foreman	one (64 weeks)
Engineer	one (64 weeks)
Engineer	two (15 weeks)
Substation Civils	ten (10 weeks)
Substation electrical	sixteen (16 weeks)
Foreman	two (15 weeks)
General operatives	three (64 weeks)

Approximately 50-60 persons will be employed during the peak of the initial decommissioning and construction phase of civil engineering of Site Access Tracks, crane hardstand, turbine foundation, and substation construction. These numbers will be somewhat less for the turbine delivery, assembly and commissioning activities. A mixture of skills will be required, including unskilled/semi-skilled/skilled manual (e.g. construction labour, machine operators), non-manual (administration roles), managerial and technical (civil, electrical, mechanical technical and engineering) and professional roles (e.g. legal, business, accounting). The manual roles will be Site-based with the other roles being predominately office-based, with Site visits as and when required. During initial decommissioning and construction, personnel will be at the Site over a number of months and during these times will likely use local accommodation and restaurants and other facilities.

Anecdotal evidence received by the Applicant on other windfarm construction projects shows that local businesses such as accommodation providers welcome enhanced level of occupancy that is achieved due to the construction contractors using their accommodation on a year round basis, including periods of the year that are traditionally considered 'low season'. The benefits of increased business, although temporary, can allow businesses to invest in improvements that would not otherwise be affordable, leading to a long-term enhancement.

Positive effects arising during the initial decommissioning and construction phase are expected to more than compensate any possible loss to tourism economy that may occur in the event that tourist visitors were deterred (accommodation being used by contractors) during this phase.

[13]Sustainable Energy Authority of Ireland (2015) A Macroeconomic Analysis of Onshore Wind Development to 2020. Available online at: https://www.seai.ie/publications/A-Macroeconomic-Analysis-of-Onshore-Wind-Deployment-to-2020.pdf [Accessed on 13 November 2019]

Whilst overall effects on the tourism economy are considered to be negligible and not significant, the benefits to individual businesses may be substantial and may indeed be significant. However, until such time as contracts are let, it is not possible to identify the level of benefit to individual businesses

The Development will create approximately two full-time jobs during the Operational phase. In addition to these jobs, various personnel will be required for the successful and continued operation of the windfarm. During the operation phase of the windfarm, the operation and reliability, maintenance (turbines, civil works, electrical infrastructure, etc.) finance, ongoing compliance with permissions and permits, safety, security, community relations and benefits, land-owner agreements etc. must be continually managed. These requirements are widely distributed over various employment sectors and are an integral part of the ongoing operation of Development and will provide continuous employment for the lifetime of the windfarm. A general outline of the employment associated with the operational phase of the windfarm is outlined in **Table 5.6** below:

Table 5.6: Parties involved during the Operational Phase[14]

Maintenance Contracts	Financial and Services Contracts	Other Stakeholders
Project Manager	Lenders	Local Community
Asset Management	Power Purchase Agreement (PPA)	Local Authority (incl. rates payments)
Turbine Contractor • Transport Companies • Crane hire • Plant and Vehicle Hire • Site Facilities	Landowner Agreements	Construction and Maintenance material suppliers
Electrical Works Contractor	Landowner Agreement	Local shops Food providers Accommodation providers
Civil Works Contractor	Insurance	Plant hire companies
Utility	Accountancy	Telecoms providers
	Safety Consultants	
	Community Liaison Officer	
	Environmental Monitoring • Noise • Ornithology • Habitat Management	

The persons fulfilling these roles may live and work anywhere in Ireland, visiting the Site as and when required, to operate and maintain the plant and equipment. During major service operations, personnel may be at the Site over several days and during these times may use local accommodation and restaurants. Therefore, overall there will be a slight **positive short-term** impact on employment in the area.

5.4.4.1 Embedded measures

The Applicant has a long track record of developing onshore windfarms in Scotland and more recently in Northern Ireland, and experience from previous windfarm construction projects is that expenditure in local goods and services is widely spread and makes a difference to existing businesses. The Applicant is committed to employing good practice measures with regard to maximising local procurement and would adopt measures such as those set out in the Renewables UK Good Practice 2014: 'Local Supply Chain Opportunities in Onshore Wind' (Renewables UK, 2014).

The Applicant will work with a variety of Tier 1 /Tier 2 contractors who will be actively encouraged to develop local supply chains throughout the local area, and work with subcontractors to invest in training and skills development. The

[14] Irish Wind Energy Association (2019) *Life-cycle of an Onshore Wind Farm.* Ionic Consulting. Available online at: https://www.iwea.com/images/files/iwea-onshore-wind-farm-report.pdf [Accessed 13 November 2019]

Applicant will run 'Meet the developer / Contractor Days'. Local companies (especially small and medium enterprises (SME) will be invited to attend these days, which are held locally, to meet with representatives across the Development, Construction and Operational teams, as well as the Applicant's Principal Contractors. This will provide the Applicant and contractors with the opportunity to brief local businesses on the types of contracts being let during the lifetime of the Development.

At this stage in the development process, it is not possible however, to quantify economic benefits in respect of individual supply chain companies, as contracts would not be let until consent is granted. However, it is evident from the Applicant's recent experience in Scotland (BVG Associates, 2017[15]) that local and regional suppliers of a wide range of goods and services will benefit from such a Development (in this case, Donegal and Ireland as a whole).

5.4.5 Land Use and Topography

With reference to **Chapter 8: Soils and Geology, Section 8.3.8,** the existing infrastructure is within areas mapped as being Low Risk (LR), Moderately Low Risk (MLR) and Moderately High Risk (MHR) in terms of land slide susceptibility. The proposed infrastructure will be positioned in areas mapped as being LR and MLR predominantly or in so far as possible, with minor portions overlapping into MHR areas.

The existing permitted land use will not be altered by the initial decommissioning and construction phase, operation and final decommissioning of the Development.

The overall impact during initial decommissioning and construction, operation and final decommissioning is predicted to be **slight, direct, negative, long-term and reversible**.

Chapter 6: Biodiversity, Section 6.6.3.4.1 and a Habitat Management Plan (**Technical Appendix 6.7)** outline a defined habitat management area and opportunities for habitat restoration and enhancement. These include areas of the Site and wider areas where habitat may benefit from practical intervention measures as well as areas of the Site that hold existing infrastructure that have the potential to be restored to peatland habitat. In both cases, if fully successful, measures have the potential to contribute to offsetting impacts resulting from habitat loss. A reduced loss in peatland will not only benefit overall biodiversity but have the added benefit of overall landscape appeal to walkers and hikers in the area.

5.5 Mitigation Measures and Residual Effects

Although no negative impact of significance has been established, there are a number of measures, which may be implemented for the safety of workers and the public during the initial decommissioning and construction, operational and final decommissioning phases.

5.5.1 Embedded Mitigation

The Development, as described in **Chapter 2: Development Description**, incorporates good practice measures for limiting the adverse effects of the initial decommissioning and construction works. The principal potential effects arising from works tend to relate to construction traffic affecting the use of the National N15 and N56 roads, local primary roads and Site Access Tracks by the general public. Measures are set out in **Chapter 14: Transport and Transport** relating to how delivery of goods and services would be managed during works to minimise impacts. The proposed mitigation measures would be further developed in an outline CEMP (**Technical Appendix 2.1)** that would be adopted prior to works commencing.

5.5.2 Population and Settlement Patterns

Given that no negative impacts have been identified, no mitigation measures are proposed.

5.5.3 Economic Activity and Tourism

Allowing for the implementation of embedded mitigation, no significant effects have been identified in respect of socio-economic receptors arising from the construction of the Development and therefore no mitigation measures are required to reduce or remedy any adverse effect.

5.5.4 Employment

Given that no negative impacts have been identified, no mitigation measures are proposed.

[15] Scottish Power Renewables (2017) Economic Benefits from Onshore Wind Farms. BVS Associates. Available online at: https://bvgassociates.com/wp-content/uploads/2017/09/BVGA-18510-Economic-impact-onshore-wind-report-r3.pdf [Accessed on 11 November 2019]

5.5.5 Land Use and Topography

Given that no negative impacts have been identified, no mitigation measures are proposed (other than embedded mitigation of minimising land take).

5.5.6 Operation

A Supervisory Control and Data Acquisition ("SCADA") system will monitor the Development's performance. If a fault occurs, then a message is automatically sent to the operations personnel preventing emergency situations.

Warning signs and security infrastructure will be in place around the onsite switchgear and control building to provide for public safety.

5.5.6.1 Residual Risk

Once the above mitigations are taken into account, the residual risk on population and human health is assessed to be an **imperceptible, long-term** effect.

5.6 Cumulative Effects

The nearest windfarm to the Site is Straness windfarm, which was built out as part of a cluster of 4 no. windfarms and entitled Meenadreen Extension Windfarm. It is located in its entirety within the boundaries of County Donegal. The closest proposed turbine (T13) is approximately 1.4 km due northwest of the Meenadreen Windfarm. The cumulative effect of the Development with Meenadreen Windfarm and other Irish renewables generation is considered to be a fundamental change in the climate effects of Ireland's energy supply, which is an important, positive effect that is significant under the EIA regulations and will contribute to Ireland's legally binding reduction targets. The Development will contribute to the offset of burning of fossil fuels which has the potential to positively impact human health.

The Landscape and Visual Impact Assessment contained in **Chapter 11: Landscape and Visual Amenity** (Section 11.4.3.7) confirms that the cumulative impact of the Development is deemed to be **Low**.

Given that the Operational Barnesmore Windfarm is already established and will continue to be used as a windfarm with the absence of amenity uses around the immediate Site, together with the Development, the cumulative impact of the Development can be predicted to be a small, short-term negative impact on tourism and amenity in the area if the decommissioning/construction periods overlap. There is predicted to be a short-term, moderate positive impact in terms of employment from the Development, if construction periods overlap.

5.7 Summary of Significant Effects

The assessment has not identified any likely significant effects from the Development on population and human health.

5.8 Statement of Significance

This chapter has assessed the significance of potential effects of the Development on population and human health. The Development has been assessed as having the potential to result in effects of a slight **positive**, **long-term** impact overall. Cumulative effects are predicted as **unlikely**.