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 (**Figure 1.2**) on population and human health. The Development refers to all elements of the application for the construction of Dyrick Hill Wind Farm (**Chapter 2: Development Description**). 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:

- Construction of the Development
- Operation and maintenance of the Development
- Decommissioning of the Development

This chapter of the EIAR is supported by figures provided in **Volume III**. A glossary of common acronyms can be found in **Appendix 1.2** in Volume IV of this EIAR.

5.2 STATEMENT OF AUTHORITY

This section has been prepared by Mr. Ryan Mitchell and Mr. Justin Lohan of Jennings O'Donovan & Partners Ltd. Mr. Mitchell has a Bachelors' Degree in Animal conservation and Biodiversity, has a strong proven background in ecology with 5 years' of experience working in the sector. He is experienced in report writing, EIAR chapter writing and project management working on EIARs for wind farm developments in Ireland.

Mr. Lohan has a Bachelors' degree in Environmental Science and Technology. He also has almost 20 years' experience working in the construction and environmental sectors. He is experienced in report writing, EIAR chapter writing and project management working on EIARs for wind farm developments in Ireland.

The chapter has been reviewed by Mr. David Kiely of Jennings O'Donovan & Partners Ltd. Mr. Kiely has 35 years' experience in the civil engineering and environmental sector. He has obtained a Bachelor's Degree in Civil Engineering and a Masters' in Environmental Protection, has overseen the construction of over 40 wind farms and has carried out numerous soils and geology assessments for EISs. He has been responsible in the overall preparation of in excess of 20 EIA Reports (EIARs).

Further details and biographies/CVs of those involved in the development of each chapter have been included in **Chapter 1: Introduction** (Section 1.10).

5.2.1 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**. The design and construction of the Development including the installation of associated equipment such as switchgear, construction of the substation etc. is governed by the 2005 Safety, Health and Welfare at Work Act, as amended, The Safety, Health and Welfare at Work (General Application) Regulations 2007, as amended, and also by The Safety, Health and Welfare at Work (Construction) (Amendment) Regulations, 2019.

The Revised EIA Directive Consultation[1] (2014/52/EU) (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".

5.2.2 Assessment Structure

In line with the EIA Directive, as amended and current EPA guidelines (2022) 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, County Waterford and County Tipperary, 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

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014L0052 [Accessed: 9th March 2023]

Limited interactions with Human Health are possible as a result of the Proposed Development therefore consideration has been given to the findings of the following assessments:

- Soils and Geology: **Chapter 8**
- Hydrology and Hydrogeology: **Chapter 9**
- Noise: **Chapter 10**
- Traffic and Transportation: **Chapter 14**
- Air and Climate: **Chapter 16**

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

All activities carried out by the appointed Contractor on the Development will be in accordance with the requirements of the Safety, Health and Welfare at Work Act 2005 as amended and Regulations made under this Act.

5.2.3 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
- Health Impacts of Wind Farms
- Property Value
- Natural Disaster and Major Accidents.
- Any potential accidents and disasters which have been assessed are outlined in this chapter. The appropriate mitigation strategies will address any further potential accidents and disasters not outlined in this document. These will be set out in the Health and Safety Plan for the Development.

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.

5.3 ASSESSMENT METHODOLOGY

In line with the EIA Directive as amended and current EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports (2022) 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 using the Central Statistics Office (CSO) data along with the current Waterford City and County Development Plan 2022-2028; and Tipperary County development Plan 2022-2028. Consideration was also given to the 2015[2] 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.

5.3.1 Definition of Study Areas

Five geographical Study Areas have been outlined for this assessment. While the greater geographical Study Areas (3, 4 and 5) 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 five Study Areas are outlined below:

Study Area 1: **The Development and Environs – District Electoral Divisions (DEDs) Ballynamult (19.8 km²) and Modelligo (20.4 km²).** In order to make inferences about the population and other statistics in the vicinity of the Site, District Electoral Divisions were analysed.

[2] 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 09 March 2023]

Study Area 2: **Waterford County** (1,857km^2) (Includes Waterford City which falls under Waterford City and County Council Jurisdiction).
Study Area 3: **Tipperary County** (4,305 km^2)
Study Area 4: **Southern region**: Counties Cork, Tipperary, Kilkenny, Waterford and Wexford (18,102km^2).
Study Area 5: **The Republic of Ireland** (70,273km^2).

The entire development falls under the Ballynamult Electoral District, Modelligo Electoral District, Seskinan Electoral District and Colligan Electoral District. The DEDs and townlands that have the potential to be affected as a result of the various elements of the Development are set out in **Table 5.0**. The windfarm developable area is situated within Boremountain, Corradoon, Ballynaguilkee upper, Dyrick, Lyrattin, Ballynaguilkee lower townlands with a small portion of the site boundary falling within Scartmountain.

Table 5.0: DEDs and Townlands that will be affected as a result of the Development and all associated works.

Element of the Development	District Electoral Division (DED)	Townlands
Grid Connection		
Option B (UGC)	Ballynamult Modelligo (ID: 6741046) Seskinan Colligan	Broemountain Lyrattin Farnane Upper Farnane Lower Derry Lower Castlequarter Mountaincastle South Carrigaun (Mansfield) Langanoran Sleadycastle Knockaunnaglokee Ballykerin Upper Garryduff Garryclone Colligan More Colliganwood Ballymacmague North Ballymacmague South Killadangan
Turbine Delivery Route	Ballynamult Seskinan	Lisleagh Ballynaguilkee Lower Kilcooney Clooncogaile

Element of the Development	District Electoral Division (DED)	Townlands
Windfarm Site	Ballynamult Modelligo (ID: 6741047)	Broemountain Corradoon Dyrick Lickoran Lisleagh Lisleaghmountain Scartmountain

Grid Connection

The proposed grid connection would be connected to the Dungarvan 110kV substation situated 12.6km southwest (16.8km Southwest by Road) of the development. The route from the 110Kv Substation follows directly to the south, passing a number of existing Underground Grid Connections (UGC) in the vicinity, and continues onto the N72 heading in a westerly direction towards Cappoquin. Continue on this route until the junctions between the N72 and R672 meet turning north onto the R672. This route is followed for approximately 4km before diverting northwest onto a local road. The UGC will continue through Sleady and crossing underneath the River Finisk near the Mountain Castle bridge and crossing the R671 continuing north to the Wind Farm site. This section of local road is approximately 8km in Length.

Turbine Delivery Route

It is proposed that the turbine nacelles, tower hubs and rotor blades will be landed in Waterford Port. From there, they will be transported to the Site via the N25 to Dungarvan and then on the N72 towards Lismore. Continuing on the N72 at Ballymacmague turning north-west onto the regional road to Clonmel R672, turn left onto the L5071 leading west. From there, following the L5071 & R671 to the proposed site entrance.

Descriptive terminology for impact assessment follows the systematic method of description of the EPA Guidelines (2022), as outlined in **Chapter 1: Introduction**, **Table 1.4**.

5.3.2 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 13/04/2022:	The Health and Safety Authority (the Authority), acting as the Central Competent Authority under the Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015 (S.I. 209 of 2015) gives technical advice to the Planning Authority when requested, under regulation 24(2) in relation to: (a) the siting and development of new establishments; (b) modifications to establishments of the type described in Regulation 12(1); (c) new developments including transport routes, locations of public use and residential areas in the vicinity of establishments, where the siting, modifications or Scoping response received 13th April 2022 The Health and Safety Authority (the Authority), acting as the Central Competent Authority under the Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015 (S.I. 209 of 2015) gives technical advice to the Planning Authority when requested, under regulation 24(2) in relation to: (a) the siting and development of new establishments; (b) modifications to establishments of the type described in Regulation 12(1); (c) new developments including transport routes, locations of public use and residential areas in the vicinity of establishments, where the siting, modifications or developments may be the source of, or

		increase the risk or consequences of, a major accident. Since the above-referenced application appears to be outside the scope of the Regulations - (the proposed Wind Farm at Dyrick Hill, Ballinamult, Co. Waterford is not in the vicinity of a COAMH establishment), the Authority has no observations to forward.

With respect to the Revised EIA Directive, Section 1.6 in **Chapter 1: Introduction** (outlined in Section 5.2.1) and the Development, this EIAR Chapter amalgamates the findings of other assessments undertaken as part of the EIA process. Some interactions on human health are possible and consideration has been given to the findings of the following assessments:

- Hydrology and Hydrogeology: Chapter 9
- Noise: Chapter 10
- Traffic and Transportation: Chapter 14
- Shadow Flicker and Electromagnetic Interference: Chapter 15
- Air and Climate: Chapter 16, Section 12.2

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

All activities carried out by the appointed Contractor on the Development will be in accordance with the requirements of the Safety, Health and Welfare at Work Act 2005, as amended, and Regulations made under this Act. The main Contractor will develop a Health and Safety Plan which will deal with risks of accidents and disasters and measures to prevent and avoid same. This is not dealt with further in this chapter.

5.4 BASELINE DESCRIPTION – RECEIVING ENVIRONMENT

5.4.1 Population and Settlement Patterns

Study Area 1: Dyrick Hill and Environs

The preliminary available 2022 census data currently does not provide detailed settlement level population data in Waterford County. Therefore, the most recent 2016 census data was deemed most appropriate for the purpose of this study. According to the 2016 census, there are no defined community settlements with a population greater than 2,500

people within a 10km radius of the Development. Dungarvan, the nearest settlement to the Proposed Wind Farm, is located approximately 12.7km southeast of the site and has a population of only 9,227[3] (CSO). The nearest centre of population to the Site is Waterford City, which is located approximately 45km east. According to the CSO, there were 127,085 persons living in Waterford City in 2022.

The surrounding area is largely rural, with a mixture of agricultural grassland, commercial forestry plantations, upland heathland, private roads and public roads. Isolated residences and farmsteads are also scattered throughout the area. Nearby settlements include the villages of Ballynaguilkee 0.8km southeast and Curradoon 0.8km east.

In December 2021, a Section 5 Declaration application was submitted to Waterford City and County Council for an 80m meteorological mast on lands at Dyrick Hill, within lands that are encompassed by the Proposed Development. A Section 5 Planning Exemption Declaration was issued by Waterford City and County Council on the 13th of June 2022. Other planning permissions in the area are for one off housing, alterations to existing dwelling houses, development of new housing and agricultural buildings, all of which have either been constructed or have expired. The 2016 Census statistics note 58 occupied residences in the Ballynamult Electoral Division (ED) and 105 occupied residences in the Modelligo ED.

While currently the nearest inhabited residential building is H106 this building will be uninhabited from the start of construction and so has not been assessed as it will not be a sensitive receptor see, **Appendix 2.3**. The next nearest inhabited building to the Wind Farm, which is considered a sensitive receptor, is H92 which is located approximately 710m from the nearest turbine T09. This property is owned by a financially involved party. The closest non financially involved property is located 750m from T02 This is a greater distance than the minimum recommended setback distance to residential housing of four times overall turbine tip height (required setback for this project is 740m), per the 2019 Draft Wind Energy Development Guidelines. There are 116 properties within 2km of the proposed turbines.

In 2016, the total population in the Ballynamult ED was 169, of which males numbered 80 and females were 89. The population density of the Ballynamult ED is 8.5 persons per square kilometre. The total population in the Modelligo ED was 294, of which males

[3] https://cso.maps.arcgis.com/apps/webappviewer/index.html?id=4d19cf7b1251408c99ccde18859ff739 [Accessed: 9th March 2023]

numbered 159 and females were numbered 135. The population density of Modelligo ED was 14.4 persons per square kilometre.

The Landscape Character Assessment (LCA) of the windfarm area itself is under the umbrella of the Tooraneena Foothills Landscape Character Area (5C) and Knockmealdown Uplands (6B). Tooraneena Foothills LCA is considered high sensitivity. It is described in the CDP as a landscape of "*Distinctive character with some capacity to absorb a limited range of appropriate new developments while sustaining its existing character''*. The LCA is characterised largely by ''*hills with slopes covered with undulating heath, bog and coniferous forestry''*. A proportion (<50%) of the site in the north west is classified as Knockmealdown uplands (6B) which is considered most sensitive and described as ''*Very distinctive features with a very low capacity to absorb new development without significant alterations of existing character over an extended area''.*

Turbine Delivery Route (TDR)

To assess potential effects on human beings and human health along the Turbine Delivery Route, a review of developments and any approved planning applications in the vicinity of the four areas outlined in **Chapter 2: Development Description,** which are planned to be the subject of temporary widening works along the Haul Route was carried out. The majority of developments along the Turbine Delivery Route comprise one-off houses. The land-use along the Turbine Delivery Route is comprised mainly of agriculture land, suburban areas such as towns and villages and small pockets of forestry. The active construction areas for the road works along the Haul Route will involve only surface-level earthworks (removal of soil and unconsolidated rock) and will be temporary in nature. The proposed Turbine Delivery Route works associated with the Proposed Development will not have any long-term negative effects on population or settlement patterns.

Grid Connection

A traffic management plan will be developed for the installation of the Grid Connection cable in the public road network. See, **Chapter 14: Traffic & Transport** which assess the impact on traffic in the surrounding environs. The traffic management plan will be discussed 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 Connection to inform local residents ahead of construction and decommissioning works. The proposed Grid Connection works associated with the proposed development will have **negligible medium to long-term negative effects** on the local population or settlement patterns.

This is because of the installation/decommissioning and general maintenance of the grid connection infrastructure such as Junction Boxes will be carried out when required over the life span of the Wind Farm.

Study Area 2: Waterford County

The total population estimates published in the 2022 CSO preliminary results for County Waterford was 127,085 of which males numbered 62,821 and females were 64,264. There has been a 9.4% increase in the population since 2016. The population density is 68.4 persons per km^2. The data available for the 2022 CSO is currently limited, as only preliminary data is available. Therefore 2016 CSO data has been used to supplement the chapter where necessary, as this is the only reliable data available to fulfil the requirements of the EAIR assessments. The total number of households was 43,549 in 2016, a 3.4% increase since 2011. Average size of households (in persons) has generally remained the same at approximately 2.8-2.9 persons per household over the past two census reports 2016-2022.

County Waterford is the twentieth largest county in Ireland with a land mass of 1,857 km^2 There are a number of medium sized towns and villages geographically spread throughout County Waterford. These settlements number 44 and provide essential services for the local communities and the rural hinterlands. The different settlement tiers perform differing roles with the result that no area in the county is significantly peripheral or isolated. This provides a reasonable platform upon which to build an integrated Local Economic and Community Plan and strong sustainable communities. The City of Waterford is the fifth largest City within the Republic of Ireland and is the primary population and economic centre within County Waterford and the Southeast region. The National Policy Framework has set an objective for Waterford City to become a regional city of scale. This would drive growth in the region in the near future (Project Ireland, 2040)[4].

The increase in rural population over a 5-year period from 2011 to 2016 in Waterford County was 4,266. The most populated towns in Waterford County are Tramore (10,381), Dungarvan (9,227) and Dunmore East (1,808). Dungarvan is one of the largest towns in County Waterford. It is an attractive coastal town and has a tourist centre for the

[4] Project Ireland 2040 Southern Region 2021 update: gov.ie - Project Ireland 2040: Regional Reports (www.gov.ie) [Accessed: 9th March 2023]

Waterford Greenway. Waterford County is a significant location for employment locally in the following sectors: wholesale and retail, technical and scientific services, and manufacturing industry[5].

According to the Census 2016 there are 3,451 people residing in the Dungarvan settlement area who are classed as being 'At Work', of which 3,345 workers commute. Dungarvan is 12.7km distant from the Site to the southeast.

Study Area 3: **Tipperary County**

The total population in the 2022 CSO preliminary results for County Tipperary was 167,661 of which males numbered 83,465 and females were 84,196. There has been a 5.1% increase in the population since 2016. The population density is 38.9 persons per km^2. The data available for the 2022 CSO is currently limited, as only preliminary data is available. Therefore, 2016 CSO data has been used to supplement the chapter where necessary, as this is the only reliable data available to fulfil the requirements of the EAIR assessments. The total number of households was 59,071 in 2016, a 1.0% increase since 2011. Average size of households (in persons) has generally remained the same at approximately 2.7 persons per household over the past two census reports (2016 & 2022).

County Tipperary is the sixth largest county in Ireland with a land mass of 4,305 km^2. There are 12 urban area settlements with populations greater than 1500 persons. The remaining 114 settlements comprised of villages with populations <1,500 persons. These medium sized towns and villages are geographically spread throughout County Tipperary. The majority of the population lives within the Rural Areas, with 55.5% of the population living in rural areas, the remaining 44.5% of the population lives in urban areas. These settlements provide essential services for the local communities. This provides a reasonable platform upon which to build an integrated Local Economic and Community Plan and strong sustainable communities.

Clonmel is the 21st largest population centre within the Republic of Ireland and is the primary population and economic centre of County Tipperary. The Regional Spatial and Economic Strategy for the Southern Region (RSES), states that the Regional Planning Objective 11: supported in targeting population growth of more than 30% for each 'Key Town'. Clonmel is specifically mentioned, '*provision should be made for population growth of more than 30% by 2040.*'

[5] Waterford City and County Council. Economic Development: Waterford Baseline Data August 2015 [Accessed: 9th March 2023]

The most populated towns in Tipperary County are Clonmel (17,140), Nenagh (8,968) and Thurles (7,940). Clonmel is the largest town in County Tipperary, an attractive historic town situated near the Munster Vale. Clonmel is a hub for the new Suir Blueway Tipperary and benefits from activity-based tourism. Clonmel is a major employment centre and accommodates 22% of all the jobs in County Tipperary. The employment strengths in Clonmel are pharma, life sciences, technology, food production and services. The high skilled work force is approximately 6,970 people with 58% of these employed in the town. A further 5,658 workers commute daily into the town illustrating its local significance[6]

Study Area 4: Southern Region

The Regional Spatial and Economic Strategy (RSES) for the Southern Regional Assembly 2040[7] outlines the assembly's aim of reversing town/village and rural population decline, by encouraging new roles and functions for buildings, streets and sites. The National Planning Framework (NPF)[8] has targeted a population growth for the Southern region of between 340,000 to 380,000, during this period, with an additional 225,000 jobs required in the region to achieve the target by 2040.

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 a third of the region's population and as such represent a sizeable cohort of the population. 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 accommodate flexible energy consumption.

Study Area 5: 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

[6] Tipperary County Development Plan 2022-2028: Volume 1 Written Statement [Accessed: 9th March 2023]
[7] Regional Spatial & Economic Strategy https://www.southernassembly.ie/regional-planning/rses [Accessed: 9th March 2023]
[8] The Department of Housing Planning and Local Government, on behalf of the Government, 'Project Ireland 2040 - The National Planning Framework' published February 2018. Available at: https://npf.ie/project-ireland-2040-national-planning-framework/ [Accessed: 9th March 2023]

Census[9]. The most recent census was taken in 2022 and the population of Ireland showing a 7.6% increase. The population has increased from 4,761,865 in the previous 2016 census to 5,123,536[10] 2022 census data. Recognising the national economic conditions within which population change occurred over the period 2016-2022, trends considered over a longer-term period demonstrate more measured and sustainable growth patterns. The National Planning Framework (NPF)[11] (2018) has set out its intention to facilitate a significant growth in Ireland's population by 2040. Full achievement of the targets set out in the 'Project Ireland 2040 National Planning Framework'[12] would accommodate around 1.1 million additional people in Ireland to 2040.

5.4.2 Economic Activity

5.4.2.1 Primary sectors

Study Area 2: Waterford County

The economy of County Waterford is broadly based and diverse with strengths in the areas of industry, health, wholesale and retail and education. The professional services sector is the largest sector of employment providing 25.3% of employment in Waterford County. Waterford has historically retained a significant Skilled trades sector. There are well-known international companies such as Waterford Crystal which closed and later re-opened. Currently the skilled trades sector employs 15.8% of the at-work population.

5.4.2.2 Primary sectors

Study Area 3: Tipperary County

The economy of County Tipperary is broadly based and diverse with strengths in the areas of retail, manufacturing, education and health, agriculture, IT and professional services. Wholesale, retail, and transport is the largest sector in Tipperary 21.9% (CSO,2016). Education, Social and Health sector is another large employment sector 20.3%. County Tipperary is nationally recognised for artisan food. The producers' network is one of the strongest in Ireland, showing the excellent enterprise and smart specialisation. County Tipperary is one of the leading economic contributors to the Irish

[9] Central Statistics Office (CSO), 'Census 2011 Reports'. Available at: https://www.cso.ie/en/census/census2011reports/ [Accessed: 9th March 2023]
[10] Central Statistics Office (CSO), 'Census 2022 Preliminary Results'. Available at: https://www.cso.ie/en/csolatestnews/presspages/2022/censusofpopulation2022-preliminaryresults// [Accessed: 9th March 2023]
[11] The Department of Housing Planning and Local Government, on behalf of the Government, 'Project Ireland 2040 - The National Planning Framework' published February 2018. Available at: https://npf.ie/project-ireland-2040-national-planning-framework/ [Accessed: 9th March 2023]
[12] The Department of Housing Planning and Local Government, on behalf of the Government, 'Project Ireland 2040 - The National Planning Framework' published February 2018. Available at: https://npf.ie/project-ireland-2040-national-planning-framework/ [Accessed: 9th March 2023]

equine breeding and racing industry, internationally recognised for excellence for thoroughbred breeding, which has attracted significant amounts of overseas investment[13].

5.4.3 Employment

5.4.3.1 Primary sectors

Study Area 2: Waterford County

According to the CSO 2016 there were 91,631 persons over 15 years of age in the labour force in Waterford County of which 45,595 (or 49.8%) were in employment.

The leading employment sectors are industry, health, wholesale, and education sectors and they employ approximately 38,685 persons[14]. Of the 53,693 persons aged 15 years and over who were outside the labour force, 10.7% were students, 8.7% were looking after the home/family and 14.8% were retired. Table 5.2 sets out labour force status in Waterford County in 2016.

Table 5.2: Waterford County Labour Force Status (2016)[15]

Principal Economic Status	No. Persons
At work	45,595
Looking for first regular job	852
Unemployed having lost or given up previous job	7,471
Student	10,311
Looking after home/family	7,633
Retired	15,121
Unable to work due to permanent sickness or disability	4,180
Other	468
Total	**91,631**

Study Area 3: Tipperary County

According to the CSO 2016 there were 122,347 persons over 15 years of age in the labour force in Tipperary County of which 61,692 (or 50.4%) were in employment. The leading employment sectors are Education, Social and health, wholesale and

[13] Horse racing Ireland economic impact study: Tipperary: Available at https://www.hri.ie/hri/publication/tipperary.pdf [Accessed: 9th March 2023]
[14] CSO, Census 2016 Summary Results – Part 2
[15] SAP2016T8T1CON17 - Population aged 15 years and over by Principal Economic Status and Sex (cso.ie) [Accessed: 9th March 2023]

manufacturing sectors and they employ approximately 35,473 persons[16]. Of the 60,655 persons aged 15 years and over who were outside the labour force, 10.3% were students, 9.1% were looking after the home/family and 15.8% were retired. Table 5.2 sets out labour force status in Tipperary County in 2016.

Table 5.3: Tipperary County Labour Force Status (2016)[17]

Principal Economic Status	No. Persons
At work	61,692
Looking for first regular job	1,032
Unemployed having lost or given up previous job	9,650
Student	12,585
Looking after home/family	11,163
Retired	19,308
Unable to work due to permanent sickness or disability	6,463
Other	454
Total	**122,347**

5.4.4 Land Use and Topography

5.4.4.1 Study Area 1: Development Site & Environs

County Waterford is located in the Southern Region Assembly and is bordered by counties Cork, Tipperary, Kilkenny and Wexford. There are 7 landscape character types across the county. According to the Landscape and Seascape Character Assessment (LSCA) for Waterford, the Proposed Wind Farm Site is located within the following landscape character types:

- Tooraneena Foothills (High sensitivity value); and,
- Knockmealdown Uplands[18] (Most sensitive value)

[16] CSO, Census 2016 Summary Results – Part 2
[17] SAP2016T8T1CON17 - Population aged 15 years and over by Principal Economic Status and Sex (cso.ie) [Accessed: 9th March 2023]
[18] Waterford City and County Draft Development Plan 2022 - 2028 Appendix 8 Landscape and Seascape Character Assessment, Scenic Routes and Protected Views

Landscape Values

"Landscape values were derived for each landscape character area by consideration of environmental and cultural benefits e.g. aesthetics, ecological, historical, socio-economic, religious, mythological etc. The values were given a score ranging from low, medium, high to outstanding."

Landscape Sensitivity

"The sensitivity of a landscape to development and therefore to change will vary according to its character and to the importance which is attached to any combination of landscape values. The sensitivity of the character areas was derived by consideration of designations such as Special Protection Areas, Natural Heritage Areas, National Parks, by information such as tourist maps, guidebooks, brochures and by evaluation of indicators such as uniqueness, popularity, distinctiveness and quality of the elements of the area." (Low to high sensitivity = 1-3, Special to Unique = 3-5 & Unique = 5)

High Sensitivity

''These areas have a distinctive, homogenous character, dominated by natural processes. Development in these areas has the potential to create impacts on the appearance and character of an extensive part of the landscape. Applications for development in these areas must demonstrate an awareness of these inherent limitations by having a very high standard of site selection, siting layout, selection of materials and finishes.''

The proposed development is currently used mainly for livestock grazing, agricultural use, in particular silage and forestry. The Site is situated on relatively high ground, at elevations ranging between 150m and 430m AOD. The highest point of the site is located between the Townlands of Scartmountain and Broemountain toward the northern portion of the Site.

5.4.5 Tourism

5.4.5.1 Waterford City County Development Plan 2022-2028

Tourism is an important market for the economy in Waterford and there are several objectives and preferred development options outlined in the Waterford County Development Plan (2022-2028) which seek to promote tourism in the county.

Chapter 4: Economy, Tourism, Education and Retail

Strategic Objectives

"To develop, deliver and promote Waterford as a year-round world class tourism destination, with authentic, memorable experiences which attracts local, regional, national and international visitors generating long term and lasting benefits to enhance and support local communities and realise additional economic growth, jobs and prosperity for the people of Waterford.

''To develop and market Waterford as a 'UNESCO Learning City', and to provide the necessary infrastructure, education and employment opportunities, complete with a University of significance, and associated accommodation, amenities and the quality of life to enable Waterford to compete at a national and international level as a modern European city of scale and significance.''

5.4.5.2 Tourist Attractions

Study Area 1: Development Site and Environs (10km)

There are several tourist attractions within a 10km radius of the Proposed Development. The nearest is Rally Connection which is a tourist attraction located approximately 2.3km south of the Site. This is a rally racetrack which attracts motor enthusiasts from the local and regional area.

Approximately 3.5 km west of the Site is the Moal Mór Hiking area on the border with County Tipperary. Also, across the county border in Co Tipperary 5.5 km from the site, is the Liam Lynch Memorial which is a National Monument and comprises a way point on a local walking trail.

Mount Melleray Abbey is a trappist monastery located 5km west to the Site. It is located on the lower slopes of the Knockmealdown upland mountain area. This was the first monastery founded in Ireland following the reformation. The French government forced out all foreign monks at the Cistercian monastery of Mellery in Brittany, France, a group of Irish and English came to Ireland in search of land. Sir Richard Keane granted their wish, and in 1832, they established Mount Melleray Abbey[19].

The town of Cappoquin, located approximately 6.6km southeast of the Proposed Development Site has several tourist attractions such as:

- Cappoquin House and Gardens. It comprsies a Classical style late Georgian House in large attractive courtyard.
- The Old Market House Arts Centre. This is a historic building with an art gallery with exhibitions and shop selling a wide selection of arts and crafts.

[19] Visit Mount Melleray Abbey with Discover Ireland

- Blackwater Boating. It provides recreational activities including kayaking, canoeing and guided hill walks along the Blackwater River and surrounding countryside of Cappoquin.
- Glenshalae Wood. It provides recreational activities including hiking, dog walking bird watching and cycling.

Study Area 2: Waterford County

Tourism in County Waterford is an important industry based on its rich natural and built heritage. The county has many picturesque towns and villages, tranquil countryside, stunning coastline, world class visitor attractions and the city of Waterford is very historic and is listed as '*Irelands oldest city'*. Waterford has a selection of festivals and various activities which take place throughout the year which attract tourists from across the country and further afield. Many areas which are important to the tourist industry of County Waterford owe their attraction to the exceptional quality of the landscape or features of the built environment[20].

County Waterford is home to several world class visitor attractions such as the Copper Coast, which is an UNESCO Global Geopark. There are many features in the landscape such as several streams flowing through deep cut valleys, many rocky headlands, stacked rocks along the coast and stunning beaches and coves. Also rich in cultural heritage with Neolithic dolmens, Iron Age forts and remains of medieval churches. Other attractions include St Declan's Cathedral in Ardmore, House of Waterford Crystal Factory and the Viking triangle in Waterford. Also the Waterford Greenway, and the Comeragh Mountains, which is a popular walking destination.

Study Area 3: Tipperary County

County Tipperary is located within two destination Fáilte Ireland regional experience brands, 'Irelands Ancient East' and 'Irelands Hidden Heartlands'. The county has a high proportion of international visitors attracted by the many cultural, natural and heritage sites. These are the strongest assets which County Tipperary has to offer from a tourism perspective. These assets include the character and historic towns, villages and communities, the scenic and variety of our landscapes, and the quality of the surrounding environment and renowned excellent food produce[21].

[20] County Draft Development Plan 2022-2028, https://consult.waterfordcouncil.ie/en/system/files/materials/805/Chapter%204.pdf [Accessed: 9th March 2023]
[21] Tipperary County Development Plan 2022 – 2028 Volume 1 Volume 1 Written Statement.pdf (tipperarycoco.ie) [Accessed: 9th March 2023]

Tourism: Numbers and Revenue

Study Area 2: Waterford County

The national tourism promotion board Fáilte Ireland oversees both national and regional tourism development and monitors key tourism performance indicators in each of the Irish regions; County Waterford is categorised as being part of the South East Region, which includes the Counties of Carlow, Kilkenny, Waterford and Wexford. Regional tourism performance figures for 2019 show the Southeast Region overseas tourist numbers totalled 945,000 and tourist revenue from overseas visitors accounted for €312,000,000 in the region. Domestic visitors from Ireland and Northern Ireland accounted for 1,795,000 visits to the region in 2019, with €370,000,000 in revenue generated from domestic visitors[22].

Study Area 3: Tipperary County

The national tourism promotion board Fáilte Ireland oversees both national and regional tourism development and monitors key tourism performance indicators in each of the Irish regions; County Tipperary is categorised as being part of the Mid-West region, which includes County Clare, Limerick and Tipperary. Regional tourism performance figures for 2019 shows overseas tourist numbers totalled 1,432,000 for the Mid-West region. The oversea tourist revenue accounted for €472,000,000. Domestic visitors from Ireland and Northern Ireland accounted for 1,197,000 visits to the region in 2019, with €217,000,000 in revenue generated from domestic visitors[23].

5.4.5.3 Tourist Attitudes to Windfarms

Public acceptance of new renewable electricity survey 2021

This study was carried out to survey Irish public opinion, specifically in relation to wind farms and their associated grid connections[24]. The study found that over 75% of the people surveyed are positively disposed to wind turbines but just 36% are willing to accept the development of wind farms within 5 km of their homes. The findings of these results are encouraging from a tourism perspective as many tourists who visit Waterford are from the domestic market which accounted for 1,795,000 visits in 2019. Per the findings of the referenced study, over three quarters of participants are positively disposed to windfarms in Ireland. Interpreted on a broader level the results of the study would appear to suggest

[22] Key Tourism Facts 2019, Failte Ireland, March 2021, https://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/4_Visitor_Insights/KeyTourismFacts_2019.pdf?ext=.pdf, [Accessed:9th March 2023].
[23] Key Tourism Facts 2019, Failte Ireland, March 2021, https://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/4_Visitor_Insights/KeyTourismFacts_2019.pdf?ext=.pdf, [Accessed:9th March 2023
[24] Public acceptance of renewable electricity generation and transmission network developments: Insights from Ireland, Manuel Tong, Koecklin,GenaroLongoria, Desta Z.FitiwiabJoseph, F.DeCarolisc, JohnCurtis , Energy Policy, Volume 151, April 2021, 112185

the development of windfarm infrastructure in County Waterford is unlikely to have a significant impact from a tourism related perspective.

In relation to acceptance levels for overhead transmission lines within 5 km of participants' homes the survey found acceptance for this to stand at 28% amongst the study group surveyed. The study results indicate there are regional variations in preferences. The results showed, the highest share of outright opposition to wind farms is in the Midlands, at 21% of respondents, and the lowest is in the Border region at 9%. The opposition to new transmission lines is highest at 44% in the South-West and lowest in the West at 18%. In respect to Dyrick Hill the grid connection is to be accommodated within the public road infrastructure as recommended per the EirGrid specification for new high voltage generator connections[25].

Scottish Tourism Survey 2016

BiGGAR Economics undertook an independent study in 2016, entitled 'Wind Farms and Tourism Trends in Scotland', to understand the relationship, if any, that exists between the development of onshore wind energy and the sustainable tourism sector in Scotland. In recent years the onshore wind sector and sustainable tourism sector have both grown significantly in Scotland. The findings of the report show that there is no pattern emerging that would suggest the development of onshore wind energy has a detrimental impact on the tourism sector. The report concludes by stating that 'Although this study does not suggest that there is any direct relationship between tourism sector growth and windfarm development, it does show that wind farms do not cause a decrease in tourism employment either at a local or a national level.'

Fáilte Ireland Surveys 2007 and 2012

In 2007 Fáilte Ireland, in association with the Northern Ireland Tourist Board (NITB), (67 wind farms established in Ireland at the time) carried out a survey of both domestic and overseas holidaymakers to Ireland to determine their attitudes toward windfarms. 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 Landsdowner on behalf of Fáilte Ireland to determine if there was any change in visitor attitudes between 2007 and 2012.

[25] 110 kV, 220 kV and 400 kV Underground Cable Functional Specification, Document Reference: CDS-GFS-00-001-R1, Dan Giustini/ESBi [Accessed:9th March 2023]

The 2007 research, presented in the Fáilte Ireland Newsletter 2008/No.3 entitled '*Visitor Attitudes on the Environment: Wind Farms'*, found that the majority of visitors felt that wind farms had either no impact (49%) or a positive impact (32%) on the landscape, whilst only 17% felt they had a negative impact. The updated study was published in the Fáilte Ireland Newsletter 2012/No.1 entitled '*Visitor Attitudes on the Environment: Wind Farms – Update on 2007 Research*'. 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 wind farm during their trip held more negative perceptions and opinions on windfarms to those that did. Of the wind farms 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 wind farm 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 wind farm is sited can have a significant impact on attitudes. Although 21% feel that wind farms have a fairly or very negative impact on sight-seeing, this figure increases substantially for wind farms in coastal areas (36%).

As part of the study, visitors were 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 wind farm in each landscape. As in 2012, the results indicate that each potential wind farm 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 wind farm. Looking across all landscapes, wind farms 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%) rated as the most scenic, and unsurprisingly resistance is greatest to wind farms in these areas. For instance, there was a greater relative negativity expressed about potential wind farms 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 wind farms of 25 turbines.

Seven out of ten (or 71%) visitors claim that potentially greater numbers of wind farms in Ireland over the next few years would have either no impact or a positive impact on their likelihood to visit Ireland. Of those who feel that the potentially greater number of wind farms 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 wind farms 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.

5.4.6 Public Perception of Wind Energy

Sustainable Energy Ireland Survey 2003

The first Wind Farm in Ireland was completed in 1992 at Bellacorrick, Co. Mayo and since then wind farms have elicited a range of reactions from Irish people (Failte Ireland, 2012). 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[26]. A windfarm catchment area survey was also carried out by SEAI (formerly SEI) in order to focus specifically on people living with a wind farm in their locality or in areas where wind farms are planned.

The survey found that the overall attitude of Irish people to wind farms is very positive, with 84% of respondents rating it positively or very positively. One percent (1%) rates it negatively and 14% had no opinion either way. Additionally, approximately two thirds of respondents (67%) were found to be positively disposed to having a Wind Farm in their locality. Where negative attitudes were voiced towards Wind Farms, the visual impact of the turbines on the landscape was the strongest influence, therefore special care should be taken to ensure that wind farms respond to contextual landscape characteristics. 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.

Similar to the national survey, the surveys of those living within the vicinity of a Wind Farm found that the findings are generally positive towards wind farms. Perceptions of the impact of the development on the locality were generally positive, with some three-

[26] Sustainable Energy Ireland (2003), Attitudes towards the Development of Wind Farms in Ireland, Dublin

quarters of interviewees believing it had impacted positively. In areas where a wind farm development had been granted planning permission but was not yet under construction, three quarters of the interviewees expressed themselves in favour of the wind farm being built in their area. Four per cent were against the development. The reasons cited by those who expressed themselves in favour of the wind farm included the fact that wind energy is clean (78%), it would provide local jobs (44%), it would help develop the area (32%) and that it would add to the landscape (13%).

Survey Update 2017

Additionally, a survey carried out by Interactions in October 2017, published by the SEAI, show 47% of Irish adults polled said they were strongly in favour of wind power in Ireland while a further 38% favour it.

The SEAI survey found that the overall attitude to Wind Farm is very positive, with 84% of respondents in favour of the use of wind energy in Ireland. Approximately two thirds of respondents (70%) would prefer to power their home with renewable energy over fossil fuels, and 45% would be in favour of a wind farm development in their area.

The final section of the 2017 report states:

> *"The overwhelming indication from this study is that wind energy enjoys great support and, more specifically, that the development of wind farms is supported and welcomed. The single most powerful indicator of this is to be found among those living in proximity to an existing Wind Farm : over 60% would be in favour of a second wind farm or an extension of the existing one. This represents a strong vote in favour of wind farm developments — especially important since it is voiced by those who know from direct experience about the impact of such developments on their communities."*

IWEA Interactions Opinion Poll on Wind Energy

Interactions Research have conducted omnibus research commissioned by Wind Energy Ireland (WEI), formerly the Irish Wind Energy Association (IWEA), in October 2017, November 2018, November 2019 and again in November 2020 with the objective to *"measure & track perceptions and attitudes around wind energy amongst Irish adults."*

The most recent survey, conducted online in November 2020 and published in January 2021[27] sampled a representative sample of 1,004 Irish adults nationwide, together with a

[27] https://windenergyireland.com/images/files/2032-wei-version-2020-for-media.pdf [Accessed: 9th March 2023]

supplementary booster sample of 203 rural dwellers. The key findings from the survey included;

- 82 per cent in favour of wind energy with 50 per cent strongly in favour
- Opposition to wind energy at 4 per cent
- Majority in rural Ireland – 52 per cent – would support a wind farm in their area while opposition is at 15 per cent
- The top five reasons for supporting wind energy were identified as
  - Good energy source
  - Good for the environment
  - Creates jobs
  - No reason to be against wind energy
  - Cheaper energy.

As a result of the ongoing research, trends in the attitudes of windfarms over the past four years can be assessed. The survey showed that the trend in attitude amongst the nationally representative sample is increasingly positive. Despite very consistent overall satisfaction, some movement can be seen over time within the rural sample from being 'strongly in Favour' towards 'tending to favour' wind power.

Public acceptance of new renewable electricity survey 2021[28]

Ireland's 2030 targets for renewables (primarily wind, solar) in electricity generation are ambitious, essentially doubling growing from 36.5% in 2019 to 70% by 2030. The electricity demand, is anticipated to be between 28% and 55% higher in 2030 compared to 2018. To meet the anticipated growth in electricity demand in Ireland, as well as achieve the renewable electricity policy targets, a substantial investment in electricity infrastructure is required. However, often these new large scale power system infrastructure developments, face strong public opposition.

The results of this survey indicates that 77% of people are positively disposed to wind turbines. However, just 36% are willing to accept the development of wind farms within 5 km of their homes.

The current research shows impact of public acceptance levels for new energy infrastructure is significant. The cost of building and operating the power system could dramatically escalate if there is a sharp deterioration in the public's acceptance of new

[28] Public acceptance of renewable electricity generation and transmission network developments: Insights from Ireland, Manuel Tong, Koecklin,GenaroLongoria, Desta Z.FitiwiabJoseph, F.DeCarolisc, JohnCurtis , Energy Policy, Volume 151, April 2021, 112185

energy infrastructure. The implication for policy and the wider electricity sector is that community and stakeholder engagement should remain a top priority.

5.4.7 Human Health

Common concerns around wind farms in terms of human health are generally associated with electromagnetic fields, shadow flicker and noise. These topics are considered in this EIAR in addition to air quality and water contamination in **Chapters 9: Hydrology and Hydrogeology, Chaper 10: Noise** and **Chapter 15: Shadow Flicker & EMI.**

5.4.7.1 General Health of Population

Human health of communities can vary greatly owing to a number of factors including susceptibility to disease, location, income inequality, access to health care etc. In 2019 the Department of Health published "Health in Ireland – Key Trends 2019" which shows population health at the national level presents a picture of decreasing mortality rates and high self-perceived health over the past ten years. Ireland has the highest self-perceived health status in the EU, with 82.9% of people rating their health as good or very good.

The 2016 census data for the general health of the population, as shown in Table 5.4, indicates the health status across three of the study areas is "Very Good" to "Good". The health status of the Site and Environs is very similar to that of County Waterford. Both these areas are in line with the national average. The "Very Good" health status for County Waterford at 59% is the same as the national average.

Table 5.4: Population by General Health (2016)

General Health	The Site & Environs (10km)	County Waterford	Ireland
	Percentage (%)		
Very good	64	59	60
Good	25	28	28
Fair	8	8	8
Bad	2	1	1
Very bad	0.5	0	0
Not stated	0.5	3	3

5.4.7.2 Electromagnetic Interference

Electromagnetic fields ("EMF") are invisible lines of force that surround electrical equipment, power cords, wires that carry electricity and outdoor power lines. Electric and magnetic fields can occur together or separately and are a function of voltage and current. When an electrical appliance is plugged into the wall, an electric field is present (there is voltage but no current); when that appliance is turned on, electric and magnetic fields are present (there is both voltage and current). Both electric and magnetic fields decrease with distance. Electric fields are also dissipated by objects such as building materials.

On a daily basis, people are exposed to extremely low frequency ("ELF") EMF as a result of using electricity. The ESB published an information booklet in 2017 called "*EMF & You*" which provides information about Electric & Magnetic Fields and the electricity network in Ireland[29].

5.4.7.3 Shadow Flicker

Chapter 15 provides the full assessment of shadow flicker for this EIAR.

5.4.7.4 Noise

Chapter 10 provides an assessment of noise in relation to the Development.

5.4.7.5 Air Quality

Chapter 16 provides an assessment of air quality in relation to the Development.

5.4.7.6 Water Contamination

Chapter 9 provides an assessment of the hydrological impacts in relation to the Development, including the potential for water contamination.

5.4.7.7 Traffic

Chapter 14 provides an assessment of traffic in relation to the Development.

5.4.7.8 Health Impact Studies

While there are anecdotal reports of negative health effects on people who live near wind farms there is no peer reviewed scientific research in support of these views. Several peer reviewed scientific research publications are outlined below.

[29] EMF & You, ESB, 2017 - https://esb.ie/docs/default-source/default-document-library/emf-public-information_booklet_v9.pdf?sfvrsn=0, [Accessed 9th March 2023]

Frontiers in Public Health published a study[30] in 2014 on wind turbines and human health. This review completed a bibliographic-like summary and analysis of the science around this issue specifically in terms of noise (including audible noise, low-frequency noise, and infrasound), EMF, and shadow flicker. The study noted that:
"*Based on the findings and scientific merit of the research conducted to date, it is our opinion that the weight of evidence suggests that when sited properly, wind turbines are not related to adverse health effects. This claim is supported (and made) by findings from a number of government health and medical agencies and legal decisions*".

The National Health and Medical Research Council (NHMRC), Australia's leading medical research body, have concluded that there is no reliable or consistent evidence that wind farms directly cause human health problems as part of their Systematic Review of the Human Health Effects of Wind Farms published in December 2013.

The review was commissioned to determine whether there is a direct association between exposure to wind farms and negative effects on human health or whether the association is casual, by chance or bias. Objectors to wind farms often refer to 'Wind Turbine Syndrome' as a condition that can be caused by living in close proximity to wind farms. The symptoms allegedly include sleep deprivation, anxiety, nausea and vertigo. It has been rejected by the wind industry and is further refuted by a review carried out by the NHMRC that wind turbines cause these sort of symptoms.

The review began in late 2012 and included a literature and background review of all available evidence on the exposure to the physical emissions produced by wind turbines. These emissions were noise, shadow flicker and electromagnetic radiation produced by wind turbines. The review concludes that the evidence considered does not support any direct association between wind farms and human health problems and that bias and confounding could be possible explanations for any reported association.

A study by the EPA in South Australia on low frequency noise near wind farms and in other environments found that *'Overall, the study demonstrates that low frequency noise levels near the wind farms in the study are no greater than levels in urban areas at comparable rural residences away from wind farms'.* The Department of Energy and Climate Change for England stated in its report Update of UK Shadow Flicker Evidence Base (2011) that it is considered that the frequency of the flickering caused by the wind turbine rotation is such that it should not cause a significant risk to health.

[30] L. D. Knopper, *et al*. (2014) *Wind turbines and human health*.

In general, there are no specific health and safety considerations in relation to the operation of a wind turbine. The area surrounding the turbine base will still be available for use as normal. Noise and Shadow Flicker are operational Health and Safety issues and have been addressed in **Chapter 10: Noise** and **Chapter 15: Shadow Flicker & EMI**.

5.4.7.9 Turbine Safety

Turbines pose no threat to the health and safety of the general public. The Department of the Environment, Heritage and Local Government (DoEHLG)'s '*Draft Revised Wind Energy Development Guidelines December 2019'* state that there are no specific safety considerations in relation to the operation of wind turbines. Fencing or other restrictions are not necessary for safety reasons. People or animals can safely walk up to the base of the turbines. The DoEHLG Guidelines state that there is a very remote possibility of injury to people from flying fragments of ice or material from a damaged blade. However, most blades are composite structures with no bolts or separate components and the danger is therefore minimised. The build-up of ice on turbines is unlikely to present problems. The wind turbines will be fitted with anti-vibration sensors, which will detect any imbalance caused by icing of the blades. The sensors will prevent the turbine from operating until the blades have been de-iced.

Turbine blades are made of fiber-reinforced polymer (FRP's) or unsaturated polyester, a non-conducting material which will prevent any likelihood of an increase in lightning strikes within the Site or the local area. Lightning protection conduits will be integral to the construction of the turbines. Lightning conduction cables, encased in protection conduits, will follow the electrical cable run, from the nacelle to the base of the turbine. The conduction cables will be earthed adjacent to the turbine base. The earthing system will be installed during the construction of the turbine foundations. In extremely high wind speed conditions, (usually at Beaufort Storm Force 10 or greater) the turbines will shut down to prevent excessive wear and tear, and to avoid any potential damage to the turbine components.

5.4.8 Property Value

There are currently no Irish studies undertaken to assess the impact of wind farms on property prices. However, a number of studies have been undertaken in the UK, with findings set out in **Table 5.9.** A study undertaken in 2014 by the Centre of Economic Research fund that house prices were driven by the property market and not the presence or absence of wind farms. Another study was undertaken in 2014 by the London School of

Economics and it did find the presence of wind farms negatively impacted property values within 2km of very large wind farms. In 2016, following on from the contrasting results of the 2014 studies ClimateXChange[31] carried out their own research in Scotland. The ClimateXChange study found no significant effect on the change in price of properties within 2km or 3km. This study also found that some wind farms can provide economic and amenity benefits to an area.

Table 5.9: Summary of Research findings between Wind Farms and Property Values

Year	Country	Research Group	Finding
2014	UK	Centre of Economic Research	In summary the analysis found that country-wide property market drives local house prices, not the presence or absence of wind farms; and The econometric analysis established that construction of wind farms at the sites examined across England and Wales has not had a detectable negative impact on house price growth within a 5km radius of the sites.
2014	UK	London School of Economics	There was an average reduction in the value of houses (based on 125,000 house sales between 2000 and 2012) of between 5% and 6% within 2km of very large wind farms.
2016	UK (Scotland)	ClimateXChange	Following a wide range of analyses, including results that replicate and improve on the approach used in the 2014 study by London School of Economics, the study did not find a consistent negative effect of wind turbines or

[31] Heblich, D. S., Olner, D. D., Pryce, P. G. & Timmins, P. C., 2016. *Impact of wind turbines on house prices in Scotland,* Scotland: ClimateXChange - https://www.climatexchange.org.uk/media/1359/cxc_wind_farms_impact_on_house_prices_final_17_oct_2016.pdf [Accessed 3rd March 2023]

Year	Country	Research Group	Finding
			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. Some wind farms provide economic or leisure benefits (e.g. community funds or increasing access to rural landscapes through providing tracks for cycling, walking)

5.4.9 Natural Disasters and Major Accidents

A wind farm is not a recognised source of pollution. Should a major accident or natural disaster occur, the potential sources of pollution onsite during both the construction and operational phases are limited. Sources of pollution with the potential to cause significant environmental pollution and associated negative effects on health include bulk storage of hydrocarbons or chemicals and storage of wastes. The Site is not regulated under the Control of Major Accident Hazards Involving Dangerous Substances Regulations i.e. SEVESO sites and so there is no potential effects from this source.

5.4.9.1 Natural Disasters

There is limited potential for significant natural disasters to occur at the Site. Ireland is a geologically stable country with a mild temperate climate. The potential natural disasters that may occur are therefore limited to peat-slide, flooding and fire. The risk of peat-slide is addressed in **Chapter 8 – Soils and Geology**. The risk of flooding is addressed in **Chapter 9 – Hydrology and Hydrogeology**. 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 9.4.4.1**). The net increase in surface water runoff relative to the scale of the Site (conservative) as a product of the Development is 0.42%; this is considered as imperceptible, and therefore any potential of increased flood risk arising as a product of the Development is considered imperceptible.

It is considered that the risk of significant fire occurring, affecting the wind farm and causing the wind farm to have significant environmental effects is limited. As described earlier, there are no significant sources of pollution in the wind farm with the potential to

cause environmental or health effects. Also, the spacing of the turbines and distance of turbines from any properties limits the potential for impacts on human health. The issue of turbine safety is addressed in **Section 5.3.6.9**.

In relation to seismic activity, Waterford is situated along major fault lines which are below the Celtic Sea. This area has occasional seismic activity and is constantly monitored by the Irish National Seismic Network (INSN). The vast majority of the seismic activity is man-made local quarry blasts, no seismic activity in the southeast of Ireland has been measured above 2.5 on the Richter scale according to the Irish National Seismic Network[32]. A tremor which can be felt would usually be above 2.5 on the Richter scale, 2.5-5.0 on the Richter scale in most circumstances causes only minor structural damage. There is no historical record of any earthquake causing serious damage in County Waterford, the surrounding counties or on the island of Ireland.

5.4.9.2 Major Accidents

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[33]. Properly designed and maintained wind turbines and associated infrastructure are a safe technology. 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.

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.

[32] Irish national Seismic network (2022) Earthquake Catalogue. Available online at: https://www.insn.ie/confirmed/ [Accessed: 9th March 2023]
[33] 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.

5.5 ASSESSMENT OF POTENTIAL IMPACTS

5.5.1 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, construction workers who are not based locally may temporarily relocate to the region. 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.

The predicted effect on the immediate settlement patterns and social patterns is also **slight to non-existent**. There is however the 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 energy supply could potentially be attractive for companies looking to develop in County Waterford and be located in the vicinity of the Site.

During the construction phase there is the potential for limited impacts on the residential amenity of the local population. These would be short-term impacts relating primarily to an increase in construction traffic causing noise, dust, and an increase in traffic volume. The levels been defined as **slight negative** in the construction and decommissioning phases and **imperceptible i**n the operational phase. The impacts of construction traffic are assessed and outlined in more detail in **Chapter 14: Traffic and Transport.**

The overall impact of the construction phase is predicted to be **slight positive and short-term** in nature should construction 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.

5.5.2 Economic Activity

During the 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 Developer on experience at other wind farms indicates that there is expected to be a peak on site workforce of up to approximately 147 workers. Some of these workers would be sourced from the local labour market in **Study Area 2: County Waterford**, but professional and

skilled personnel may be required to be sourced from areas inclusive of **Study Area 4: Southern Region** or even further afield.

During the construction and initial commissioning 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 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. Ready-mix concrete and crushed stone will also be sourced from a local supplier, again subject to authorisation, and to quality and quantity being available.

Employees involved the construction of the Development will most likely use local shops, restaurants and hotels/accommodation. Therefore, overall, there will be a **slight, positive impact** on economic activity in the Region. 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 onshore wind farms in Southwest Scotland[34]. 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.

Waterford City and 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

[34] Economic Benefits from onshore wind farms, September 2017, BVG Associates, accessed 18/05/21

annually and managed by the local community or an independent body by the local community. The purpose of the community fund is to enable the local community to share in the benefits of the Development. Community benefit 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 construction phase of the Development and **moderate, positive and long-term** during the operational phase.

5.5.3 Employment

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 construction phase, operational and decommissioning phases of the Development and that are filled by employees of the Developer 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 the Port of Waterford; 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 (**Table 5.10**).

Table 5.10: 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%)

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. Similarly, the Irish 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 SEAI, 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 13 new long-term jobs for a 36MW powered installation.

The Development will create the most employment during the construction phase. It is estimated that up to 147 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 5.11: Estimated Employment breakdown during the construction phase of the Development

Occupation/Task	**No. of People (Employment Period)**
Foundation team	eight (10 weeks)
Tracks & Hardstands (truck drivers)	eight (36 weeks)
Plant drivers	four (52 weeks)

Occupation/Task	No. of People (Employment Period)
Foreman	one (56 weeks)
Engineer	one (56 weeks)
Engineer	two (12 weeks)
Substation Civils	ten (10 weeks)
Substation electrical	sixteen (16 weeks)
Foreman	two (15 weeks)
General operatives	three (56 weeks)

Approximately 123-147 persons will be employed during the peak of the construction phase of civil engineering of access roads, 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 (construction labour and machine operators), non-manual (administration roles), managerial and technical (civil, electrical, mechanical technical and engineering) and professional roles (legal, business and accounting). The manual roles will be Site-based with the other roles being predominately office-based, with Site visits as and when required. During 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.

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.

Whilst overall effects on the tourism economy are considered to be negligible and not significant, the benefits to individual businesses will be substantial and significant.

The Development will create approximately 29-35 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 wind farm. During the operation phase of the wind farm, the operation and reliability, maintenance (turbines, civil works and electrical infrastructure) finance, ongoing compliance with permissions and permits, safety, security, community relations and benefits and land-owner agreements must be continually managed. These requirements are widely distributed over various employment sectors and are an integral part of the ongoing operation of the Development and will provide continuous employment

for the lifetime of the wind farm. A general outline of the employment associated with the operational phase of the wind farm is outlined in **Table 5.12.**

Table 5.12: Parties involved during the operational phase[35]

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

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.

[35] 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: 9th March 2023]

5.5.3.1 Embedded measures

The Developer has a long track record of developing wind farms internationally with a globally installed onshore wind generation capacity of 700MW[36]. The Developer's experience from previous wind farm construction projects is that expenditure in local goods and services is widely spread and makes a difference to existing businesses. The Developer is committed to employing good practice measures with regard to maximising local procurement and will 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 Developer will work with a variety of 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.

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 Developer's recent experience that local and regional suppliers of a wide range of goods and services will benefit from such a Development (in this case, Waterford and Ireland as a whole).

5.5.4 Land Use and Topography

Chapter 8: Soils and Geology concludes that providing the mitigation measures proposed are fully implemented and best practice, as described, is followed on Site, it is not expected that there will be any significant impacts associated with the Development. It is recommended that suitable monitoring programmes are proposed and implemented to see that there is adherence to the CEMP and to the mitigation measures outlined here during construction, operation and Decommissioning of the wind farm.

5.5.5 Tourism

Fáilte Ireland published guidelines in 2011 for the treatment of tourism in an EIAR, 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**.

[36] About — emp.energy [Accessed: 9th March 2023]

Fáilte Ireland published a study on 'Visitor Attitudes on the Environment' in 2012[37] 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 5.3.5) there is not expected to be any direct relationship between the tourism sector growth and this Development. Based on the findings of the collective assessments, it is considered that the Development will not give rise to any significant effects. Overall effects of the Development with regards to tourism are considered to be **short-term**, **slight, negative** during both construction and decommissioning phases and a long-term, **slight positive** impact during operation.

5.5.6 Human Health

5.5.6.1 Electromagnetic fields

Electromagnetic fields from wind farm infrastructure, including the grid connection, are very localised and there is considered to be an **imperceptible, long-term** impact.

5.5.6.2 Shadow flicker

Chapter 16: Shadow Flicker & EMI provides an impact assessment of the potential for shadow flicker from the Development.

5.5.6.3 Noise

A baseline assessment of the existing background noise conditions was carried out, the results of which are presented in **Chapter 10: Noise** of the EIAR. A noise assessment of the operational phase of the Development has also been carried out through modelling of the Development using noise prediction software. The predicted noise levels for the Development have been compared with the existing background noise levels and the guidance levels for noise emissions from wind farms as set out by the Department of the Environment, Heritage and Local Government (DoEHLG). In summary, the noise

[37] Fáilte Ireland (2012) Visitors Attitudes on the Environment – Wind Farms - https://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/4_Visitor_Insights/WindFarm-VAS-(FINAL)-(2).pdf?ext=.pdf [Accessed: 9th March 2023]

assessment found that no properties in the Study Area are predicted to experience noise levels above 40dB.

5.5.6.4 Air Quality

Chapter 17: Air Quality & Climate provides an assessment of air quality in relation to the Development. The impact assessment concluded that:

The Development has been assessed as having the potential to result in slight, negative, temporary/short-term effects during construction.

Potential cumulative effects were assessed as being of a **slight, negative, short-term** impact. As per the EIA Directive, the EIAR should contain a description of the likely significant effects of the project. The potential effects of the Development on air quality are considered **not significant**.

5.5.6.5 Geology and Soils

Chapter 8: Soils and Geology found that provided the mitigation measures outlined are fully implemented and best practice is followed on Site, it is not expected that there will be any significant impacts associated with the Development. It is recommended that suitable monitoring programmes are implemented so that there is adherence to the CEMP and to the mitigation measures outlined therein during construction, operation and decommissioning of the wind farm.

5.5.6.6 Water Contamination

Chapter 9: Hydrology and Hydrogeology provides an assessment of the hydrological impacts in relation to the Development, including the potential for water contamination. The conclusion is referenced at **Section 9.6** and states that:

''During the construction, operational and decommissioning phases of the proposed Development, activities will take place at the Site that will have the potential to significantly affect the hydrological regime or water quality at the Site or its vicinity. These significant potential impacts generally arise from sediment input from runoff and other pollutants such as hydrocarbons and cementitious substances, with hydrocarbons or chemicals spills to surface waters having the most potential for impact.''

5.5.6.7 Traffic

Chapter 14: Traffic and Transport provides an assessment of the traffic impacts in relation to the Development. The conclusion is referenced at **Section 14.11** and states that:

''This assessment has identified no potentially significant effects, given the mitigation measures embedded in the design and recommended for the implementation of the Development''

5.5.6.8 Accidents/Disasters (incorporating Health & Safety)

As with any development, there is the potential for a number of accidents to occur. In the context of human health and safety, these will be addressed under two main headings, accidents to personnel and accidents to plant and equipment ('infrastructure').

Accidents to Personnel

- Risks present during the construction, operation/maintenance and decommissioning phase of the development, which have potential to cause injury to personnel, may include but are not limited to:
- Burial under earthfalls / engulfment in swampland
- Falling from height
- Work which puts personnel at work at risk from chemical or biological substances
- Work which involves energies – utilities such as electricity, gas, water, pressurized equipment
- Work exposing personnel to the risk of drowning
- Work involving the assembly or dismantling of heavy prefabricated components
- Construction activities which have potential to cause accidents/incidents
- Use of vehicles or mobile plant / machinery / equipment

Accidents to Infrastructure

Potential risk to infrastructure, again for the construction, operation/maintenance and decommissioning phases include but are not limited to:

- Burial under earthfalls / engulfment in swampland which impact the ground conditions of nearby structures, collapse of structures
- Falling from height causing damage to property
- Work which puts infrastructure at risk from chemical or biological substances
- Work which involves energies – utilities such as electricity, gas, water, pressurized equipment which have potential to cause damage through fire, explosion, pressure release etc.
- Work involving the assembly or dismantling of heavy prefabricated components
- Construction activities which have potential to cause accidents/incidents
- Use of vehicles or mobile plant / machinery / equipment – failure of plant/machinery/equipment, loss of control

CEMP + Health and Safety Plan

A health and safety plan will be finalised ahead of any works on site. Also, the accompanying Final CEMP is an essential document to ensure maintaining appropriate health and safety guidance and therefore reduce the risk to on-site accidents occurring.

5.5.7 Property Value

Based on the available published studies,the operation of a wind farm at the Site would not significantly impact on property values in the area. The Development will have a **long-term imperceptible** impact on property values.

5.6 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 construction, operational and decommissioning phases.

5.6.1 Embedded Mitigation

The Development, as described in **Chapter 2: Development Description**, incorporates good practice measures for limiting the adverse effects of the construction works. Allowing for the implementation of embedded mitigation, no significant effects have been identified in respect of adverse effects to the construction workers and therefore no mitigation measures are required to reduce or remedy any adverse effect.

5.6.2 Construction Traffic

The principal potential effects arising from works tend to relate to construction traffic affecting the use of National Roads, local primary roads and access roads by the general public. Measures are set out in **Chapter 14: Traffic and Transport** relating to how delivery of goods and services would be managed during works to minimise impacts. The proposed mitigation measures have been further developed in the outline CEMP (**Appendix 2.1**).

5.6.3 Population and Settlement Patterns

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

5.6.4 Economic Activity

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.

5.6.5 Employment

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

5.6.6 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).

5.6.7 Tourism

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

5.6.8 Human Health

5.6.8.1 Accidents/Disasters (incorporating Health & Safety)

Accidents to Personnel

Potential risks to personnel were identified in Section 5.4.6.8. Current legislation relating to the Safety, Health and Welfare of persons at work and industry specific Codes of Practice / Guidance documents, are designed to assist in the management of risks associated with the construction, operation, maintenance and decommissioning phase of windfarm projects.

The construction of the Proposed Development shall be managed in accordance with the Safety, Health and Welfare at Work Act 2005 (as amended), the Safety, Health and Welfare at Work (General Application) Regulations 2007 (as amended), and the Safety Health and Welfare at Work (Construction) Regulations 2013 (as amended).

As required under the Safety, Health and Welfare at Work (Construction) Regulations 2013, the Client shall appoint a Project Supervisor for the Design Process (PSDP) and a Project Supervisor for the Construction Stage (PSCS). The PSDP shall compile a Preliminary Safety and Health Plan (PSHP), which details general information about the

project and envisaged health and safety risks. The PSHP shall be made available to the PSCS. The PSCS shall develop a Construction Stage Health and Safety Plan (CSHSP) which incorporates the information contained in the PSHP and details how safety and health will be managed during the construction of the project. The PSCS may also develop the following documents for the construction stage:

- Construction and Environmental Management Plan
- Emergency Response Plan
- Detailed Traffic Management Plan

Accidents to Infrastructure

The PSDP shall ensure the General Principles of Prevention are taken into account for all designs relating to the project.

On very rare occasions, the structural integrity of wind turbines has failed. This is an extremely rare occurrence and, given that the turbines will be designed and installed by an experienced turbine contractor and are located well away from public roads and dwellings in line with the DoEHLG Draft Revised Wind Energy Development Guidelines (2019), it is not considered that, in the unlikely event of an accident of this type, any significant impacts to population or human health would result.

Potential accidents, such as a risk of incident during haulage, a fire on site or the risk of a turbine structural failure is assessed to be a **slight, negative, long-term effect.**

5.6.8.2 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.

5.6.8.3 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.

5.6.9 Cumulative Effects

The nearest operational wind farm to the Site is Tierney Single Turbine comprising of one turbine located 3.5km to the northeast of the site. The next nearest is Woodhouse Wind

Farm (Woodhouse) Wind Farm comprising 8 no. wind turbines located 10.8km to the south-east of the Site Boundary. In addition, Coumnappaul Wind farm which is in pre-planning stage is situated 7.1km to the west of the Site Boundary.

The cumulative risk of the surrounding operational and pre-planning stage wind farms on population and human health is assessed to be an **imperceptible, long-term** effect.

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 having **slight positive, long-term impact** overall, particularly in terms of employment and community financial benefit.