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 Tullaghmore Wind Farm (**Chapter 2: Project Description**). Where negative effects are predicted, the chapter identifies appropriate mitigation strategies therein. The assessment considers 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.

5.1.2 Relevant Legislation and Guidance

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

The design and construction of the Development including the installation of associated equipment such as switchgear, upgrade of the substation etc. is governed by the 2005 Safety, Health and Welfare at Work Act, The Safety, Health and Welfare at Work (General Application) Regulations 2007 and also by S.I. 291 The Safety, Health and Welfare at Work (Construction)(Amendment) Regulations, 2019.

The EIA Directive as amended (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".

5.1.3 Assessment Structure

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

- Assessment Methodology and Significance Criteria – a description of the methods used in baseline surveys and in the assessment of the significance of effects
- Baseline Description – a description of the socio-economic profile of the local area of the Development i.e., local electoral areas and County Galway, 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

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
- Air and Climate: Chapter 10
- Noise: Chapter 11
- Traffic and Transportation: Chapter 15

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.*

5.1.4 Scope of the Assessment

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

- Population and Settlement Patterns
- Economic Activity and Tourism
- Employment
- Topography and Land Use

- Health Impacts of Wind Farms
- Property Value
- Natural Disaster and Major Accidents.

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.

5.2 ASSESSMENT METHODOLOGY

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

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

A desk study was undertaken using the Central Statistics Office (CSO) data along with the currently adopted Galway County Development Plan (CDP) 2015-2021 and draft Galway County Development Plan 2022-2028. Consideration was also given to the 2015[1] report produced by the EPA entitled the *'Investigation into the Assessment of Health Impacts within National Environmental Regulation Processes'* that outlines how human health impacts are dealt with, throughout the European Union (EU) by environmental regulators with an emphasis on the role at the planning / environment interface.

5.2.1 Definition of Study Areas

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

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

Area 2 and information outlined for Study Area 2 incorporates data for Study Area 1. The four Study Areas are outlined below:

Study Area 1: **The Development and Environs – District Electoral Divisions (DEDs) Letterfore, Cill Chuimin, Camas, An Turlach and Kilcummin (292.5km^2).** In order to make inferences about the population and other statistics in the vicinity of the Site, District Electoral Divisions (DEDs) were analysed.

The entire Development falls under the Connemara Municipal District (Connemara North and Connemara South). The location of the main windfarm site falls within the Letterfore DED, while the Proposed Grid Route falls within Letterfore, Cill Chuimin, Camas and An Turlach DEDs. The four areas along the haul route which require works in third party lands fall within Letterfore, Camas and Kilcummin DEDs. Each DED can be separated into distinct townlands. The DEDs and townlands that have the potential to be affected as a result of the various elements of the Development are outlined in **Table 5.1**.

The windfarm itself is predominantly situated within Tullaghmore, Tullaghboy Derrybeg and Tawnaghbeg townlands with a small portion of the site boundary falling within Cappanalaurabaun and Curraun Hill.

Table 5.1: 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
Haul Route Works			
	#1	Letterfore	Knockaphreaghaun
	#2	Letterfore	Knockaphreaghaun
	#3	Camas	Derravonniff
	#4	Kilcummin	Ballynahown South
Grid Route			
	Option A (UGC)	Letterfore Cill Chuimin Camas An Turlach	Bunnakill Derreennagusfoor Lurgan Ardderrynagleragh Derroogh North Knockaphreaghaun Knockadav Illeny Gleann Trasna Derravonniff Glencoh

Element of the Development	District Electoral Division (DED)	Townlands
Windfarm Site	Letterfore	Letterfore Tullaghboy Tawnaghbeg Tullaghmore Derrybeg Curraun Hill Cappanalaurabaun

Grid Route

A connection between the Proposed Development site and the national electricity grid will be necessary to export electricity from the proposed windfarm. It is intended that the Proposed Development will connect to the national grid via the existing Screebe 110kV Substation (Screebe Substation), located in the townland of Glencoh, Co. Galway. The Screebe Substation is located approximately 10.5km southwest of the Proposed Development at its closest point. The proposed grid connection route sees the grid connection between Tullaghmore Windfarm and Screebe 110kV ESB Substation as an underground cable (UGC), utilising sections of cabling in public roads, primarily regional public roads, as well as private third-party lands. The length of the grid connection is c.18.65km.

Haul Route

It is proposed that the turbine nacelles, tower hubs and rotor blades will be landed in Galway-Port. From there, they will be transported to the Site via the R336 to Maam Cross and then the N59 east to the upgraded site entrance. All of the road works associated with the Development will involve only surface-level earthworks (removal of soil and unconsolidated rock). No significant impacts to humans are envisaged as a result of the temporary road widenings due to the scale of the works.

Study Area 2: **Galway County** (6,151km^2) (excludes Galway City which falls under Galway City Council Jurisdiction).

Study Area 3: **The North and West region**: Counties Galway, Mayo, Roscommon, Leitrim, Sligo, Cavan, Monaghan and Donegal (25,800km^2).

Study Area 4: **Ireland** (70,273km^2).

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

5.2.2 Consultation

Consultation with relevant organisations was initiated during the initial stage of the EIA to identify any effects that could be initiated by the Development. A summary of the findings is detailed in **Table 5.2**.

Table 5.2: Summary of Consultation response on Human Health

Consultee	Type and Date	Summary of Consultee Response
Environmental Health Service (Dept. of the HSE)	Letter in Response to Scoping Report received on 05/11/2021	Response Received 05/11/2021: Recommendations were made on *Assessment of Consideration of Alternatives, Noise and Vibration, Shadow Flicker, Air Quality, Climate, Surface and Ground Water Quality* and *Geological Impact. (*Addressed respectively in Chapters 3, 10, 12, 8 and 9). The Environmental Health Service (EHS) recommended that the matters of Public Consultation and Decommissioning Phase were included and assessed in the EIAR (Addressed in Chapter 1). A section on *Public consultation* further recommended that the applicant develop a dedicated website for the proposed wind energy project. All correspondence, maps, project updates and documentation, including the EIAR, should be uploaded to this site (Addressed in Chapter 1). A section on *Ancillary Facilities* recommended that the EIAR should include details of the location of all site office, construction compound, fuel storage depot, sanitary accommodation and canteen, First Aid facilities, disposal of wastewater and the provision of a potable water supply to the site canteen (Addressed in **Chapter 2: Project Description**). A section on *Cumulative Impacts* recommended that the EIAR should include a detailed assessment of any likely significant cumulative impact of the proposed renewable energy development (Addressed in Chapter 1 and in the relevant technical assessment chapters of the EIAR).

With respect to the EIA Directive as amended, **Section 1.6.2** (outlined in **Section 5.1.2**) and the Development, this amalgamates the findings of other assessments undertaken as part of the EIA process. Limited interactions with human health are possible and consideration has been given to the findings of the following assessments:

- Hydrology and Hydrogeology: Chapter 9
- Noise: Chapter 10
- Shadow Flicker and Electromagnetic Interference: Chapter 12
- Air and Climate: Chapter 15
- Traffic and Transportation: Chapter 14

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

5.3 BASELINE DESCRIPTION – RECEIVING ENVIRONMENT

5.3.1 Population and Settlement Patterns

Study Area 1: Tullaghmore and Environs

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. Oughterard, the nearest settlement to the Proposed Windfarm, is located approximately 9.4km southeast of the site and has a population of only 1,318[2] (CSO). The nearest centre of population to the Site is Galway City, which is located approximately 30km southeast. According to the CSO, there were 78,668 persons living in Galway City in 2016.

The surrounding area is largely rural, with a mixture of peatland, agricultural grassland, commercial forestry plantations, private roads and public roads. Isolated residences and farmsteads are also scattered throughout the area. Nearby settlements include the villages of Maam Cross 5.8km west and Derryglinna 4.6km southeast.

In June 2021, permission was granted for retention of a meteorological mast on lands at Tullaghmore, within lands that are encompassed by the Proposed Development. 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 99 occupied residences and a total population of 264 in the Letterfore Electoral Division.

[2] https://cso.maps.arcgis.com/apps/webappviewer/index.html?id=4d19cf7b1251408c99ccde18859ff739

The nearest inhabited residential building to the windfarm, which is considered a sensitive receptor, is located approximately 740m from the nearest turbine; this is further than the required minimum setback distance to housing of four times overall turbine tip height (required setback for this project is 740m). There are 30 properties within 2km of the proposed turbines. In 2016, the total population in the Letterfore ED was 264, of which Males numbered 133 and Females were 131. The population density of the Letterfore ED is 2.9 persons per square kilometre.

The Landscape Character Assessment (LCA) of the windfarm area itself is under the umbrella of the East Connemara Mountains Landscape Character Area (10) and Lough Corrib & Environs LCA (11). The East Connemara Mountains LCA is characterised as largely mountainous with slopes covered with coniferous forestry and is considered *'scenic although not remarkable'*. The Lough Corrib & Environs LCA is characterised by a dramatic expanse of water including many islands supporting deciduous woodland. The land around the northern part of the Lough is undulating heath, bog and coniferous forestry whereas the land surrounding the southern section is flat, open grassland. The landscape of the Lough and its surrounds is considered highly scenic and includes many facilities for visitors.

Grid Route

In order to assess potential impacts on human beings and human health along the grid connection route, a review of properties and planning applications in the vicinity of the proposed works was carried out, with the majority of developments along the route comprising one-off houses. The land-use along the grid connection comprises mainly transport, and surrounding land use is mainly agriculture with some areas of peat harvesting and forestry. There is an existing 110kV overhead line which runs to the south and east of the grid route. The active construction area for the grid connection will be small and transient in nature as it moves along the route. The proposed grid route associated with the Proposed Development is not envisaged to have any long-term negative impacts on population or settlement patterns.

Haul Route

To assess potential impacts on human beings and human health along the turbine Haul Route, a review of properties and planning applications in the vicinity of the four areas which are planned to be the subject of temporary widening works along the Haul Route was carried out. The majority of developments along the route comprises one-off houses. The land-use along the Haul Route is comprised mainly of transport infrastructure, and surrounding land use is mainly agriculture with some areas of peat harvesting and forestry.

The route passes through four defined settlements - Galway City, Bearna, Na Forbacha and An Spidéal. However, all haul route works are proposed outside of defined settlement areas. 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 Haul Route works associated with the Proposed Development will not have any long-term negative impacts on population or settlement patterns.

Study Area 2: Galway County

The total population in the 2016 CSO for County Galway was 179,390 of which Males numbered 89,863 and Females were 89,527. There has been a 2.4% increase in the population since 2011. The population density is 29 persons per km^2. The total number of households was 63,040 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.

Galway is the second largest county in Ireland with a land mass of 6,149km^2. The economic performance of Galway is strong and plays a critical role in both regional and national economies. The settlement pattern of County Galway is based on a strong network of vibrant and robust towns and villages with service centres provided at strategic locations throughout the county.

There are a number of medium sized towns and villages geographically spread throughout County Galway. These settlements number 81 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 Local Economic and Community Plan (LECP) sets out the objectives and actions needed to promote and support the economic development and the local and community development of County Galway. The LECP is compiled by Local Community Development Committees of which there is one in each local authority area, established under the Local Government Reform Act 2014, of which there is one in each local authority area. The increase in rural population over a 5 year period from 2011 to 2016 in Galway County was 4,266. The towns of Tuam (8,767), Ballinasloe (6,662), Loughrea (5,556) and Oranmore (4,990) are the most populated within the County. Tuam, the largest town in County Galway is a vibrant and thriving town, a key regional centre for health social and cultural activities. According to the Census 2016 there are 4,065 people residing in the Tuam settlement area who are classed as being 'At Work', of which 3,192 workers commute. Tuam is 40km distant from the Site to the east.

Study Area 3: Northern and Western Region

The Regional Spatial and Economic Strategy (RSES) for the Northern and Western Regional Assembly 2040[3] outlines the assembly's aim of reversing of town/village and rural population decline, by encouraging new roles and functions for buildings, streets and sites. The National Planning Framework (NPF)[4] has targeted a population growth for the northern and western region of between 160,000 to 180,000, during this period, with an additional 115,000 jobs required in the region to achieve this target.

RSES notes that the population living in rural towns, villages and the countryside (i.e., other than the cities and regional centres and key towns) are home to almost 80% of our region's population and as such represent a sizeable cohort of the population and an area. Population growth needs to be matched by the delivery of critical enabling infrastructure and services, thus ensuring that these places grow as successful significant employment centres and service locations not only for the urban areas themselves but, importantly, for their extensive hinterlands that include smaller towns, villages and rural areas. The RSES outlines the need to strategically prepare for locally based energy networks enabling locally produced energy to export to the grid and flexible energy consumption.

Study Area 4: Ireland

Ireland has seen a rapid population growth in recent years with improved standard of living and infrastructure growth resulting in a net inflow of the population. The Country has seen a population increase since 1911 from 3,139,688 to 4,588,252 as per the 2011 Census[5]. The most recent census was taken in 2016 and noted a 3.7% increase on the 2011 statistics, bringing the total population count to 4,757,976[6]. Recognising the national economic conditions within which population change occurred over the period 2011-2016, trends considered over a longer-term period demonstrate more measured and sustainable growth patterns. The National Planning Framework (NPF)[7] (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'[8] would accommodate around 1.1 million additional people in Ireland to 2040.

[3] Northern & Western Regional Assembly, *'Regional Spatial & Economic strategy 2020-2032 (RSES)'*. Available at: https://www.nwra.ie/rses/
[4] 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/
[5] Central Statistics Office (CSO), 'Census 2011 Reports'. Available at: https://www.cso.ie/en/census/census2011reports/
[6] Central Statistics Office (CSO), 'Census 2016 Reports'. Available at: https://www.cso.ie/en/census/census2016reports/
[7] 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/
[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/

5.3.2 Economic Activity

5.3.2.1 Primary sectors

Study Area 2: Galway County

The economy of County Galway is broadly based and diverse with strengths in the areas of industry, health, wholesale and retail and education. The industry sector is the largest sector of employment providing 16.3% of employment in Galway County. There are several well-known international companies which fall into the industry sector located in Galway County, including HP, Cisco, EA, Allergan, Baxter, Medtronic and Boston Scientific. Galway also has a very significant health and social work sector, employing 13% of the 'at work' population.

5.3.3 Employment

5.3.3.1 Primary sectors

Study Area 2: Galway County

According to the CSO 2016 there were 85,054 persons over 15 years of age in the labour force in Galway County of which 75,116 (or 54.1%) were in employment.

The leading employment sectors are industry, health, wholesale and education sectors which employ approximately 38,685 persons[9]. 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 Galway County in 2016.

Table 5.3: Galway County Labour Force Status (2016)

Principal Economic Status	No. Persons
At work	75,116
Looking for first regular job	936
Unemployed having lost or given up previous job	9,002
Student	14,877
Looking after home/family	12,099
Retired	20,569
Unable to work due to permanent sickness or disability	5,724
Other	424
Total	**138,747**

[9] CSO, Census 2016 Summary Results – Part 2

5.3.4 Land Use and Topography

5.3.4.1 Study Area 1: Development Site & Environs

County Galway is located in the Northern and Western Region Assembly and is bordered by counties Mayo, Roscommon, Offaly, Tipperary and Clare. Due to the expanse and variety of Galway County's landscape there are 25 landscape character types across the county. According to the Landscape Character Assessment (LCA) for Galway, the Proposed Windfarm Site is located within two landscape character types:

- East Connemara Mountains (Moycullen, Recess to Glinsk) ('High' value / 'High with pockets of special' sensitivity)
- Lough Corrib and environs ('Outstanding' value / 'Unique with pockets of high and special' sensitivity)

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)

The Windfarm Site is currently used mainly for livestock grazing, in particular sheep. The Site is situated on relatively high ground, at elevations ranging between 93m and 262m AOD. The highest point of the Site is located between the Townlands of Derrybeg and Tullaghmore, toward the northern portion of the Proposed Development site with an elevation of 262m AOD.

Grid Route

According to the Landscape Character Assessment (LCA) for Galway, the grid route is located within three landscape character types:

- East Connemara Mountains (Moycullen, Recess to Glinsk) ('High' value / 'High with pockets of special' sensitivity)
- West Foothills of east Connemara Mountains (Glenicmurrin Lough environs) ('High' value / 'High' sensitivity)
- Carraroe (Cashla Bay to Glenoh) ('High' value / 'High with coastal edge of special' sensitivity)

The grid connection is proposed to be an UGC, utilising sections of cabling in public roads, primarily regional public roads, as well as private third-party lands. Given the underground nature of this grid route option, there will be no significant impact on the landscape and landscape value of the area once the cable ducting has been laid.

Haul Route

To assess potential impacts on human beings and human health along the turbine Haul Route, a review of landscape values and sensitivity in the vicinity of the four areas which will be subject to temporary widening works along the Haul Route was carried out. According to the Landscape Character Assessment (LCA) for Galway, the Haul Route works are located within two landscape character types:

- #1 & #2: East Connemara Mountains (Moycullen, Recess to Glinsk) ('High' value / 'High with pockets of special' sensitivity)
- #3 & #4: Carraroe (Cashla Bay to Glenoh) ('High' value / 'High with coastal edge of special' sensitivity)

The active construction areas for the temporary road widening works along the Haul Route will involve only surface-level earthworks (removal of soil and unconsolidated rock) and will be temporary in nature to allow turbine component deliveries. Therefore, the proposed Haul Route works associated with the Proposed Development will not have any long-term negative impacts on the landscape or landscape value.

5.3.5 Tourism

5.3.5.1 Tourist Attractions

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

There are a number of tourist attractions within a 10km radius of the Proposed Development. The nearest is the Derroura Forest Mountain Bike trail which runs parallel to the proposed Site Access Track for a stretch of approximately 3.6km to where it then loops around Derroura Forest.

A popular tourist attraction located approximately 4km southeast the Site is the Quiet Man Bridge, made famous in the 1950s by the classic movie "The Quiet man". Associated with this attraction is a walking trail – the Míle Órga Loop, which begins just before the bridge and then loops for 2.6km west of the bridge to give views of the nearby lake - Lough Adrehul then back toward the bridge.

Curraghduff Farm is a tourist attraction located approximately 3km northeast of the Site. The farm is a family farm which has an alpaca walking experience and glamping facilities.

Oughterard, located approximately 9.25km southeast of the Proposed Development Site is a popular tourist village. There are several tourist attractions in and around the town including the Glengowla Mines, Aughnanure Castle and the New Village Forest Walking Trail. Glengowla Mines are 'show mines' which provide history on the mining history of the area.

Approximately 5.8km west of the site is the small village of Maam Cross which is home to two tourist attractions – the quiet man replica cottage and the Connemara Railway Maam Cross Heritage Centre.

Lough Corrib, approximately 750m north of the Proposed Development, is home to recreational activities including kayaking and luxury yacht hire

Castle Kirk, also called Hen's Castle, is a fortress or tower house and National Monument located on a small island in Lough Corrib.

Grid Route

Screebe Waterfall is located along the proposed grid connection route. The waterfall is identified as a scenic spot and is visible from the R336 public road. It should be noted that there are distribution/phone lines along the R336 in the vicinity of the waterfall, and an existing OHL visible from this scenic spot.

Screebe Fishing Hut is also located along the proposed grid connection route. It is setback a distance of approximately 175m from the R336. This scenic spot is not visible from the R336. Pearce's cottage and cultural centre (Ionad Cultúrtha an Phiarsaigh), is located approximately 2.3km west of Screebe 110kV ESB Substation.

Haul Route

Screebe Waterfall is located along the proposed Haul Route. The waterfall is identified as a scenic spot and is visible from the R336 public road. None of the four areas requiring temporary widening works along the Haul Route are located in the vicinity of any tourist attractions, therefore impacts of the haul route on tourism are unlikely.

Study Area 2: Galway County

Tourism in County Galway is an important industry based on its rich natural and built heritage. Many areas that are important to the tourist industry of County Galway owe their attraction to the exceptional quality of the landscape or particular features of the built environment[10]. For example, Connemara National Park is located approximately 28km west of the Proposed Development Site which features 2,000 hectares of mountains, bogs, heaths, grasslands and forests along with a 19th-century graveyard as well as 4,000-year-old megalithic court tombs. There are a number of objectives and preferred development options outlines in the Galway CDP (2015-2021) which seek to promote tourism in the county. The CDP (2015) states *"augmenting the tourism base and supporting sustainable rural-resourced enterprise, is critical to ensuring a balanced approach to the further development of the County".* Objective DS 5 – Protection and Management of the Assets of the County states the goal of the CDP to *"Protect and manage the assets that contribute to the unique visual and environmental character and sense of identity of County Galway, and which underpin tourism, heritage, biodiversity and quality of life".*

5.3.5.2 Tourism: Numbers and Revenue

Study Area 2: Galway County

The West Region, which includes the Counties of Galway, Mayo and Roscommon has consistently been the second most popular region in Ireland outside Dublin for overseas tourists and domestic visitors. Regional Tourism performance figures for 2019 for the West Region shows overseas tourist numbers for the West Region totalled 1,943,000 in 2019 and tourist revenue accounted for €653,000,000 in the region from overseas tourists. Domestic visitors from Ireland and Northern Ireland accounted for 1,848,000 visits to the region in 2019, with €370,000,000 in revenue generated from domestic visitors[11].

County Galway is home to a number of nationally renowned visitor attractions including; the Spanish Arch, Eyre Square, Galway Cathedral and Galway City Museum all located in or

[10] County Development Plan 2015-2021, http://www.galway.ie/en/services/planning/planspolicy/gcdp2021/, accessed 02/11/2021
[11] 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 02/11/2021

around Galway City, as well as Conemara National Park, Kylemore Abbey & Victorian Walled Garden, and the Aran Islands in the wider County of Galway. Abbey and Gardens was one of the top fee charging attractions in Ireland in 2019, with 560,000 visitors.

Galway is also included in the 'Wild Atlantic Way" which is one of the longest defined costal routes in the world. It was devised as a new 'experience' and 'destination' by Fáilte Ireland to present the West Coast of Ireland as a compelling international tourism product. It is an over-arching brand which individual destinations and businesses can trade collectively with much greater potential visibility and clarity of message in the international marketplace[12].

5.3.5.3 Tourist Attitudes to Windfarms

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 Landsdowne on behalf of Fáilte Ireland to determine if there was any change in visitor attitudes between 2007 and 2012.

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

[12] Wild Atlantic Way1 Operational Programme 2015-2019, Failte Ireland, August 2015, https://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/2_Develop_Your_Business/Key%20Projects/Wild-Atlantic-Way-Operational-Programme_1.pdf, accessed 02/11/2021

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.

5.3.6 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[13]. 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-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

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

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 farms 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[14] sampled a representative sample of 1,004 Irish adults nationwide, together with a 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

[14] https://windenergyireland.com/images/files/2032-wei-version-2020-for-media.pdf

- 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 represented 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.

5.3.7 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.

5.3.7.1 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 Galway. Both these areas are in line with the national average. The "Very Good" health status for County Galway at 59% is the same as the national average.

Table 5.4: Population by General Health (2016)

General Health	The Site & Environs (10km)	County Galway	Ireland
	Percentage (%)		
Very good	56	59	59
Good	33	29	28
Fair	6	9	8
Bad	2	1	1
Very bad	0	0	0
Not stated	3	2	3

5.3.7.2 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. National and international health and scientific agencies have reviewed more than 35 years of research including thousands of studies. None of these agencies has concluded that exposure to ELF-EMF from power lines or other electrical sources is a cause of any long-term adverse effects on human, plant, or animal health. The International Commission on Non-Ionising Radiation Protection (ICNIRP) Guidelines give a limit of 100µT for sources of AC magnetic fields. This compares to 0.13µT for 110kV underground cable when directly above it, 1.29µT for 220kV underground cable when directly above it and 11.4µT for 400kV AC underground cable that is one metre deep and measured directly above it. The ESB published an information booklet in 2017 called "EMF & You" which provides information about Electric & Magnetic Fields and the electricity network in Ireland[15].

[15] EMF & You, ESB, 2017 - https://esb.ie/docs/default-source/default-document-library/emf-public-information_booklet_v9.pdf?sfvrsn=0, accessed 14/05/2021

In 2014 a study was undertaken in Canada[16], measuring electromagnetic fields around wind farms and the impact on human health. The study found: from Canada found that:

"there is nothing unique to wind farms with respect to EMF exposure; in fact, magnetic field levels in the vicinity of wind turbines were lower than those produced by many common household electrical devices and were well below any existing regulatory guidelines with respect to human health".

5.3.7.3 Shadow Flicker

Chapter 12 provides the full assessment of shadow flicker for this EIAR.

5.3.7.4 Noise

Chapter 11 provides an assessment of noise in relation to the Development.

5.3.7.5 Air Quality

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

5.3.7.6 Water Contamination

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

5.3.7.7 Traffic

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

5.3.7.8 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.

Frontiers in Public Health published a study[17] 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*

[16] Lindsay C McCallum, *et al*. (2014) *Measuring electromagnetic fields (EMF) around wind turbines in Canada: is there a human health concern?*
[17] L. D. Knopper, *et al*. (2014) *Wind turbines and human health*.

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 this 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.

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 have been addressed in **Chapter 10** and **Chapter 12**.

5.3.7.9 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 '*Wind Energy Development Guidelines for Planning Authorities 2006*' 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 considerations. 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 fibre-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.

5.3.8 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 5.5.** A study undertaken in 2014 by the Centre of Economic Research found 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 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 or found the effect to be positive. The IR study also found that some wind farms can provide economic and amenity benefits to an area. The Development will include for the upgraded tracks that can be used by walkers within the Site and will provide a significant community benefit fund for the local area.

Table 5.5: Summary of Research finding 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 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

5.3.9 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 due to there being none of these sites in proximity of the Proposed Development, therefore there is no potential effect envisaged from this source.

5.3.9.1 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 9.3.8**). The net increase in surface water runoff relative to the scale of the Site as a product of the Development is 0.05%; this is considered as imperceptible, and therefore any potential risk of increased flood risk arising as a product of the Development is considered imperceptible.

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 earthquakes, Galway is situated along the boundary of a collision between two ancient continents. On 6th June 2012 at 09:30am local time, an earthquake of magnitude 4 occurred in an area roughly 40 miles off the Mayo coast at a depth of 3km (over 100km from the Site Boundary to the northwest). The effects were felt right across county Mayo and in north Connemara and in some areas along the Galway coast[18]. The earthquake was detected automatically by the Irish National Seismic Network (INSN). There are several fault lines across Galway; the Site is located directly on a fault line, however there is no historical

[18] Irish national Seismic network (2021) Earthquake Catalogue. Available online at: https://www.insn.ie/confirmed/ [Accessed on 02 November 2021]

record of any earthquake causing serious damage in County Galway, the surrounding counties or on the island of Ireland.

5.3.9.2 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[19]. 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.

5.4 ASSESSMENT OF POTENTIAL IMPACTS

5.4.1 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, green energy supply could potentially

[19] 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.

be attractive for companies looking to develop in County Galway 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.

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

The overall impact 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.

5.4.2 Economic Activity

During the construction phase, there would be economic effects resulting from the expenditure on items such as Site preparation, Site Access Roads, 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 onsite workforce of approximately 63 workers. Some of these workers would be sourced from the local labour market in Study Area 2, but professional and skilled personnel may be required to be sourced from areas inclusive of Study Area 4 or even further afield.

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

It is envisaged that labour and materials will be sourced from the local area during construction where possible. 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 in 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 employment 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[20]. 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.

Galway County Council will benefit from payments under both the Development Contribution Scheme and from the annual rate payments. The Applicant is also committed to a 'Community Benefit' package. This package will be advertised annually and managed by the local community or an independent body by the local community. The purpose of the community fund is to enable the local community to share in the benefits of the Development. Coillte and SSE's community benefits funds typically support local projects, with funds allocated to projects from all aspects of the community.

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

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

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

5.4.3 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 Port of Galway; 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 of 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 5.6**).

Table 5.6: 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 an estimated 13 for a 40.8MW powered installation.

The Development will create the most employment during the construction phase. It is estimated that up to 63 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 5.7: 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)
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 63 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.

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

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 two full-time jobs during the operational phase. In addition to these jobs, various personnel will be required for the successful and continued operation of the 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 5.8.**

Table 5.8: Parties involved during the operational phase[21]

Maintenance Contracts	Financial and Services Contracts	Other Stakeholders
Project Manager	Lenders	Local Community

[21] 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 02/11/2021]

Maintenance Contracts	Financial and Services Contracts	Other Stakeholders
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.

5.4.3.1 Embedded measures

The Developer has a long track record of developing wind farms internationally with a globally installed onshore wind generation capacity of 8,690.11MW[22]. The Developers 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

[22] https://www.rwe-production-data.com/list/WN/

to employing good practice measures regarding 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, Galway and Ireland as a whole).

5.4.4 Land Use and Topography

Chapter 8: Soils and Geology found 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.

5.4.5 Tourism

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

Fáilte Ireland published a study on 'Visitor Attitudes on the Environment' in 2012[23] 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.

[23] 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 on 13/11/2019]

Based on historical examples and findings of the BiGGAR Economics report (mentioned in **Section 5.3.5.3**) there is not expected to be any direct relationship between the tourism sector growth and this Development.

Landscape impacts on the 'Quiet Man Bridge' are predicted to be substantial to moderate, but will not be significant and therefore, it can be predicted that tourism impacts on the bridge will be moderate, negative.

Based on the findings of the collective assessments, it was 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, **slight, negative** during the construction, operational and decommissioning phases.

5.4.6 Human Health

5.4.6.1 Electromagnetic fields

Electromagnetic fields from wind farm infrastructure, including the grid connection to the 110kV Screebe substation, are very localised and are considered to be **imperceptible, long-term** impact.

5.4.6.2 Shadow flicker

Chapter 12 provides an impact assessment of the potential for shadow flicker from the Development.

5.4.6.3 Noise

A baseline assessment of the existing background noise conditions was carried out, the results of which are presented in **Chapter 10** 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). The Draft Revised Wind Energy Development Guidelines of December 2019 propose noise restriction limits consistent with World Health Organisation Guidelines[24], proposing a relative rated noise limit of 5dB(A) above existing background noise within the range of 35 to 43dB(A), with 43dB(A) being the maximum noise limit permitted, day or night. In summary, the noise assessment found that

[24] WHO (2018) Environmental Noise Guidelines - https://www.euro.who.int/en/health-topics/environment-and-health/noise/environmental-noise-guidelines-for-the-european-region [Accessed on 25/05/2022]

no properties in the Study Area are predicted to experience noise levels above 40dB, therefore the potential effects of noise caused by the Proposed Development are considered **not significant.**

5.4.6.4 Air Quality

Chapter 15 provided an assessment of air quality in relation to the Development. The impact assessment is 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. Given that only effects of significant impact or greater are considered "significant" in terms of the EIA Regulations, the potential effects of the Development on air quality are considered **not significant**.

5.4.6.5 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 both the construction and operational 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…

…The implementation of mitigation through avoidance principles, pollution control measures, surface water drainage measures and other preventative measures have been incorporated into the project design in order to minimise potential significant adverse impacts on water quality at the Site…

…This in turn will reduce the potential for adverse impacts on downstream designated Sites…

…Implementation of the control measures outlined in this EIAR are considered to result in a likely, neutral to negative, imperceptible to slight significance"

5.4.6.6 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:

"The Development has generally been assessed as having the potential to result in effects of a negative, slight/moderate, direct, short-term, high probability effect or lower during the construction and Decommissioning phase only. After mitigation, the residual effects have been assessed as imperceptible/slight, negative and short-term in nature. There will be a slight positive residual effect from road strengthening, widening and surfacing works along the Haul Route. This effect could be temporary or permanent depending on the preference of Galway County Council"

5.4.6.7 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 phases of the Development, which have potential to cause injury to personnel, may include but are not limited to:

- Burial under earthfalls / falling into bog holes or soft peat areas
- 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 / falling into bog holes or soft peat areas which impact the ground conditions of nearby structures, collapse of structures
- Falling from height causing damage to property
- Work which puts personnel at work at risk from chemical or biological substances

- Work which involves energies – utilities such as electricity, gas, water, pressurised 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

5.4.7 Property Value

Based on the available published studies, that 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.

5.5 MITIGATION MEASURES AND RESIDUAL EFFECTS

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

5.5.1 Embedded Mitigation

The Development, as described in **Chapter 2: Development Description**, incorporates good practice measures for limiting the adverse effects of the construction works. 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 CEMP (**Appendix 2.1**).

5.5.2 Population and Settlement Patterns

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

5.5.3 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.

5.5.4 Employment

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

5.5.5 Land Use and Topography

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

5.5.6 Tourism

Mitigation measures for recreation, amenity and tourism are primarily related to the preliminary design stage of the Development, which has allowed for the prevention of unnecessary or inappropriate development to occur that will significantly affect any recreational or tourist amenity. In designing the Development, careful consideration was given to the potential impact on landscape amenity.

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

5.5.7 Human Health

5.5.7.1 Accidents/Disasters (incorporating Health & Safety)

Accidents to Personnel

Potential risks to personnel were identified in **Section 5.4.6**. 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. Pending approval of the application, the PSCS may also develop the following documents during the pre-construction stage of the Proposed Development, for implementation during the construction stage:

- Construction and Environmental Management Plan (updated from the CEMP in **Appendix 2.1**)
- Emergency Response Plan
- Detailed Traffic Management Plan

Accidents to Infrastructure

The PSDP shall see that the General Principles of Prevention, outlined under the safety design advice provided by the Health and Safety Authority (HSA),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 (in the unlikely event of an accident of this type) that it would result in any significant impacts to population or human health.

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.

5.5.7.2 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.

5.5.7.3 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.

5.5.8 Cumulative Effects

The nearest operational wind farm to the Site is Galway Wind Farm Phase 1 (Ugool) comprising 24 no. wind turbines located 12.6km to the south-east of the Site Boundary. The next nearest wind farm to the Proposed Development is Galway Wind Farm Phase 2 (Seecon) comprising 36 no. turbines located 13.4km to the southeast of the Site Boundary. The Proposed Development, along with Galway Wind Farm Phases 1 & 2 and other Irish renewables generation is considered to be a fundamental change in the climate effects of Ireland's energy supply, which is an important, positive effect that is significant under the EIA regulations and will contribute to Ireland's legally binding reduction targets. The Development will contribute to the offset of burning of fossil fuels which has the potential to positively impact human health.

The Landscape and Visual Impact Assessment contained in **Chapter 11: Landscape and Visual Amenity** (**Section 11.4.5**) confirms that the cumulative impact of the Development is not considered to be significant.

The cumulative impact of the Development can be predicted to be a **small, short-term negative** impact on tourism and amenity during construction. There is predicted to be a **short-term, moderate positive** impact in terms of employment from the Development.

5.6 Summary of Significant Effects

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

5.7 Statement of Significance

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