White Hill Wind Farm

Environmental Impact Assessment Report

Chapter 4: Population & Human Health

White Hill Wind Limited

Galetech Energy Services
Clondargan, Stradone, Co. Cavan Ireland
Telephone +353 49 555 5050
www.galetechenergy.com

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4.1 Introduction

This chapter presents an assessment of the likely effects of the project on population and human health. Human beings comprise a significant element of the environment and any likely effects on the status of population and human health must be comprehensively addressed. This includes the existence, activities and wellbeing of people. Whilst most developments will affect other people, the EIAR concentrates on those topics which are manifested in the environment, such as new land uses, more buildings or greater emissions.

The European Commission document *Guidance on the preparation of the Environmental Impact Assessment Report* (2017) states that:-

> *"Human health is a very broad factor that would be highly project dependent. The notion of human health should be considered in the context of the other factors in Article 3(1) of the EIA Directive and thus environmentally related health issues (such as health effects caused by the release of toxic substances to the environment, health risks arising from major hazards associated with the project, effects caused by changes in disease vectors caused by the project, changes in living conditions, effects on vulnerable groups, exposure to traffic noise or air pollutants) are obvious aspects to study. In addition, these would concern the commissioning, operation, and decommissioning of a project in relation to workers on the project and surrounding population"*

This EIAR also addresses the likely impact on population and human health in specific chapters, including, for example, in respect of Air Quality & Climate (**Chapter 8**), Landscape (**Chapter 9**), Noise and Vibration (**Chapter 11**), Shadow Flicker (**Chapter 12**) and Interactions between these environmental issues and population and human health (**Chapter 14**).

Specific issues which are examined under this chapter include *inter alia*:-

- Economic Activity - will the development stimulate additional development and/or reduce economic activity and, if either, what type, how much and where?;
- Social Consideration - will the development change patterns and types of activity and land use?;
- Land-uses - will there be severance, loss of rights of way or amenities, conflicts, or other changes likely to ultimately to alter the character and use of the surroundings?;
- Tourism - will the development affect the tourism profile of the area?; and,
- Health and Safety - will there be risks of death, risks to public health, disease, discomfort or nuisance?

Likely significant effects may occur as a result of direct interaction between the project and population and human health receptors (e.g. farming operations affected as a result of construction activities) or indirectly, such as employment created as a result of the local spending of wages earned by the construction workforce during the construction phase of the project.

4.1.1 Statement of Authority

The assessment of likely significant effects on population and human health, and preparation of this EIAR chapter, has been undertaken by various members of the Galetech Energy Services (GES) Environment & Planning Team. GES has substantial socio-economic/population and human health assessment experience having

prepared Population & Human Health (Human Beings) chapters for multiple permitted and proposed developments which have been subject to EIA, including those listed at **Section 1.11** (**Chapter 1**).

4.1.2 Description of the Project

In summary, the project comprises the following main components as described in **Chapter 3**:-

- 7 no. wind turbines with an overall tip height of 185m, and all associated ancillary infrastructure;
- All associated and ancillary site development, excavation, construction, landscaping and reinstatement works, including the provision of site drainage infrastructure;
- Upgrades to the turbine component haul route; and,
- Construction of an electricity substation and installation of c. 15km of underground grid connection cable between the White Hill Wind Farm and the existing Kilkenny 110kV electricity substation.

The wind farm site traverses the administrative boundary between counties Carlow and Kilkenny; with 4 no. turbines located in Co. Carlow and 3 no. turbines within Co. Kilkenny. The electricity substation is located within Co. Carlow while the majority, c. 14km, of the underground electricity line is located in Co. Kilkenny. Off-site and secondary developments; including the forestry replant lands and candidate quarries which may supply construction materials; also form part of the project.

The turbine component haul route and associated upgrade works as described in **Chapter 3**. It is envisaged that the turbines will be transported from the Port of Waterford, through the counties of Kilkenny, Waterford, Carlow and Kildare to the project site. However, as the route follows motorway and national roads through counties Waterford and Kildare, it is assessed that there is no likelihood of effects on population & human health and, therefore, these areas have been screened out from further assessment.

A full description of the project is presented in **Chapter 3**.

4.2 Policy and Guidance

The following section sets out the policy and guidance which is considered to be of relevance to an assessment of effects on population and human health for a project of this type.

4.2.1 National Policy

4.2.1.1 *Wind Energy Development Guidelines for Planning Authorities 2006*

The *Wind Energy Development Guidelines for Planning Authorities 2006* ('the 2006 Guidelines') offer advice to planning authorities in determining planning applications for wind farm developments, including the likely significant effects on human health and population.

4.2.1.2 *Draft Revised Wind Energy Development Guidelines (December 2019)*

The *Draft Revised Wind Energy Development Guidelines* ('the Draft Guidelines') were published in December 2019. The Draft Guidelines include updates to several key aspects of the *Wind Energy Development Guidelines for Planning Authorities 2006*, including in respect of matters which interrelate with population and human health effects; namely noise, visual amenity and shadow flicker.

4.2.2 Regional Policy

Regional policy, as it relates to population and human health, is derived from the Southern Regional Assembly *Regional Spatial and Economic Strategy* (RSES). The RSES seeks to provide a framework through which national policies; including in relation to economic, environmental and quality of life factors; are implemented across the Southern Region which includes Co. Carlow and Co. Kilkenny.

4.2.3 Local Policy

Relevant local planning policies are derived from the following:-

- *Carlow County Development Plan 2022-2028*; and,
- *Kilkenny City & County Development Plan 2021-2027*.

4.2.3.1 *Carlow County Development Plan 2022-2028*

The *Carlow County Development Plan 2022-2028* ('the Carlow CDP 2022-2028') outlines a set of strategic objectives which also relate to the project and population & human health, including as follows:-

- Transition to a low carbon and climate resilient County by developing renewable indigenous energy resources, by supporting energy efficiency, reducing energy demand, and by implementing mitigation and adaptation responses to climate change;
- Conserve and enhance the County's Green Infrastructure and ecosystem services supporting the sustainable management of natural assets and the biodiversity of the County's protected habitats and species to provide a wide range of environmental, social and economic benefits to communities;
- Promote the provision and maintenance of high quality infrastructure and infrastructural networks and environmental services which seek to complement the overall economic and settlement strategy and contribute to the sustainable development of the area; and,
- Promote, develop and maintain sustainable communities in the County, through the provision of a range of facilities and services to meet the diverse and expanding needs of all residents including the needs of younger persons, thereby supporting community participation and social inclusion, and improving the quality of life for everyone.

4.2.3.2 *Kilkenny County Development Plan 2021-2027*

The *Kilkenny County Development Plan 2021-2027* ('the Kilkenny CDP 2021-2027') sets out key principles and objectives regarding the delivery of development in an appropriate and sustainable manner, including as follows:-

- To facilitate development of housing, economic development, services and infrastructure in the smaller towns and villages of the county at a scale and character which is appropriate in order to sustain and renew population and services in these areas;
- To ensure the highest standards of environmental protection in the assessment of planning applications for all development proposals;
- To ensure the sustainable development of the District towns in the County to achieve their target populations and enhance their capacity to attract new investment in employment, services and public transport for the benefit of their own populations and that of their rural hinterlands;
- To promote a diverse and sustainable local economy through the designation of sufficient lands for employment related uses, including

facilities, to promote SME growth through the local area plans for the District towns;
- To integrate the planning and sustainable development of the county with regard to the social, community and cultural requirements of the county and its population;
- To prepare and support the implementation of a Green Infrastructure Strategy for County Kilkenny, as resources allow; and,
- To review the progress of the Climate Change Strategy, report on the progress to date, and thereafter develop a new strategy and action plan in line with national policy.

4.2.3.3 *EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2022)*

The EPA Guidelines state that an EIAR does not generally require assessment of land-use planning, demographic issues or detailed socio-economic analysis unless the project gives rise to likely significant effects in respect of new developments and infrastructure which affect economic or settlement patterns.

Whilst the project will not result in any associated development, such as a housing or commercial development, it will lead to the generation of employment during both the construction and operational phases as well as inward investment which may affect the local supply chain. On this basis, the EIAR baseline contains a brief summary of key socio-economic baseline data relating to the wider study area (see **Section 4.3.2** below) and the likely effects on this baseline environment are considered.

In relation to likely effects on human health, the Guidelines state that the EIAR should refer to the assessments of those factors under which human health effects might occur (e.g. under the relevant environmental factors of air quality, water and soil). The importance of avoiding duplication of the assessment of likely effects is highlighted (i.e. care should be taken to avoid 'double-counting' effects that are identified elsewhere in the corresponding chapter of the EIAR, for example noise or air quality effects). As a result, likely effects which may arise from these specific environmental topics are addressed in their respective chapters. The likely interactions of these effects, if any, are addressed in **Chapter 14**.

The Guidelines state that assessments of other health and safety issues are carried out under other EU Directives, as relevant e.g. reports prepared under the Integrated Pollution Prevention and Control frameworks or SEVESO Directive etc. In keeping with the requirement of the EIA Directive, an EIAR should take account of the results of such assessments without duplicating them.

Whilst there are no other environmental permits required for the project in addition to the necessary planning permission, this EIAR does contain elsewhere a detailed consideration of effects related to population and human health, most notably in relation to Air Quality and Climate (**Chapter 8**), Landscape (**Chapter 9**), Noise & Vibration (**Chapter 11**), Shadow Flicker (**Chapter 12**) and Material Assets (**Chapter 13**).

4.2.3.4 *EIAR Guidelines for the Consideration of Tourism and Tourism Related Projects* (Failte Ireland)

These Guidelines recognise that the impact and interaction of tourism with the environment is complex and the assessment of environmental impacts is crucial to creating a sustainable tourism economy and protecting natural resources. It is also

acknowledged that tourism can be affected both by direct and indirect effects of new developments as well as by interactions between new activities and tourism activities; for example, the effects of high volumes of heavy goods vehicles passing through hitherto quiet, scenic, rural areas.

The Guidelines set out that the EIAR should indicate the location of sensitive nearby tourism resources that are likely to be directly affected, and other premises which may be the subject of secondary impacts such as alteration of traffic flows or increased urban development. The EIAR should indicate the numbers of premises and visitors likely to be affected directly and indirectly.

4.2.3.5 *EMF & You: Information about Electric & Magnetic Fields and the electricity network in Ireland* (ESB, 2017)

The provision of electrical apparatus is common practice throughout Ireland and their installation does not give rise to any specific health concerns. The extremely low frequency (ELF) and electrical magnetic fields (EMF) associated with the operation of the electrical equipment will, as is required by legislation, comply fully with the international guidelines for ELF and EMF set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP), a formal advisory agency to the World Health Organisation, as well as the EU guidelines for human exposure to EMF.

The ESB document '*EMF & You*' (ESB, 2017)[1] provides further practical information on EMF.

4.2.3.6 Supplementary Guidance & Information Sources

Other advice and guidance, reviewed as part of the baseline assessment and in developing the assessment methodology include:-

- *Code of Practice for Wind Energy Development in Ireland* (Department of Communications, Climate Action and Environment, 2016);
- *Best Practice Guidelines for the Irish Wind Energy Industry* (Irish Wind Energy Association, 2012);
- *Best Practice Principles in Community Engagement and Community Commitment* (Irish Wind Energy Association, 2013);
- *An Enterprising Wind: An economic analysis of the job creation potential of the wind sector in Ireland* (Irish Wind Energy Association, 2014);
- *Wind Turbine Experiences – 2012 Survey Results* (British Horse Society, 2013); and,
- *Wind Turbines and Horses - Guidance for Planners and Developers* (British Horse Society, 2015);

Key socio-economic data for the baseline has been derived from:-

- Central Statistics Office (CSO);
- *Carlow County Development Plan 2015-2021*;
- *Carlow County Development Plan 2022-2028*
- *Kilkenny City & County Development Plan 2021-2027*
- Carlow County Council *A socio-demographic profile of Carlow 2019*;
- Pobal Profiling GIS Data (https://maps.pobal.ie/);
- Fáilte Ireland data in conjunction with websites of relevant tourism sites and amenities in the area;
- Fáilte Ireland *Key Tourism Facts 2019* (2021);
- Carlow Tourism *County Carlow Tourism Strategy and Action Plan 2020-2025*;

[1] https://esb.ie/docs/default-source/default-document-library/emf-public-information_booklet_v9.pdf?sfvrsn=0

- Kilkenny County Council *Tourism Statement of Strategy and Work Programme 2017-2022;*
- Carlow County Council *County Carlow Local Economic and Community Plan 2016-2021;*
- Kilkenny County Council County Kilkenny *Local Economic and Community Plan 2016-2021;* and,
- OSI mapping and aerial photography.

4.3 Methodology

4.3.1 Desk Based Research

The majority of effects on population and human health receptors are likely to be experienced during the construction phase. These are likely to include potential beneficial effects on the local economy, including employment opportunities and increased spend on local services as well as potential adverse effects, such as restrictions on farming operations, neighbouring businesses or general disruption to the amenity of the local area, including in respect of road traffic, which may indirectly impact on its recreation or tourism value. Once operational, effects are likely to be primarily related to the visual impact and potential noise effects from the wind farm.

In respect of human health, the chapter takes into consideration the results of other assessments in the EIAR which have relevance to health, namely: soils; water; air quality; noise; shadow flicker; and landscape. The findings of these assessments are cross referenced in this chapter but the effects will not be repeated to avoid duplication of coverage or 'double-counting'.

Employment effects and direct expenditure are quantified using data provided by the Developer and, where necessary, using standard industry data. Opportunities for local businesses and the local labour market to be involved in supply chain activities will be identified and where possible quantified. The likely effects of the proposed community ownership model are assessed also.

4.3.2 Study Area

The spatial focus of the assessment is undertaken at two levels. Firstly, effects on specific community, recreation and tourism receptors are assessed at a local level which is defined as 5km from the wind turbines and 500m from the grid connection route, and is referred to as the 'Local Study Area' (LSA).

Economic effects are assessed with regard to a wider study area that takes account of a likely 'catchment' for provision of domestically sourced goods and services relating to the construction and operation of the wind farm. This study area comprises the counties of Carlow and Kilkenny and is referred to as the 'Wider Study Area' (WSA). Given the scale of the project it is not intended to measure effects at a national or international level.

Study Areas	Spatial Extent
Wider Study Area	Counties of Carlow and Kilkenny
Local Study Area	5km from the wind turbines and 500m from the grid connection

Table 4.1: Study Area Details

A desk-based review of existing conditions in the area has been undertaken, covering the following themes:-

- Wider Study Area
  - Population;
  - Labour Market/Education and Skills;
  - Business Diversity and Supply Chain; and,
  - Visitor Economy.
- Local Study Area
  - Recreational assets;
  - Visitor attractions; and,
  - Visitor accommodation and other businesses/services serving the tourism economy.

4.3.3 Consultation

A range of statutory and non-statutory organisations have been consulted as part of the EIAR scoping process. The responses which are relevant to likely effects on population and human health are summarised in **Table 4.2** and provided at **Annex 1.8**.

Consultee	Comments	Reference within EIAR
Carlow County Council	Impacts on residential properties and residential amenity should be assessed; construction phase noise levels should be assessed; and effects from EMF should be assessed.	Each of the items referred to are assessed at **Section 4.5** below.
Failte Ireland	Supplied copy of *EIAR Guidelines for the Consideration of Tourism and Tourism Related Projects*.	Incorporated into methodology.
Kilkenny County Council	Construction and operational noise effects; effects of shadow flicker; and EMF effects shall each be assessed.	Each of the items referred to are assessed at **Section 4.5** below.

Table 4.2: Scoping advice relating to Population and Human Health

Separately, the Developer has also engaged in an extensive public consultation process during the design phase of the project. This process involved 3 no. separate approaches in which the Developer consulted with the local community by seeking the input of local residents, landowners, business owners and all relevant stakeholders. The various approaches were implemented to ensure that consultation and engagement was continued with local residents while fully accordance with the relevant public health guidelines in place at the time (COVID-19).

Firstly, an appointed Community Liaison Officer (CLO) provided an information pack to all dwellings located within 2km of a wind turbine. Residents were advised of the details of the project and advised of means of contacting the CLO where comments were invited and welcomed.

Secondly, door-to-door consultation was completed, once public health advice allowed for same.

Finally, a series of information clinics were held in the locality. These clinics allowed members of the public, by appointment only (in accordance with public health

guidance), including those who may have resided beyond 2km from a turbine and were not initially contacted by the CLO, to discuss the project with members of the project team.

A comprehensive overview of the Developer's approach to public consultation is provided at **Annex 1.9**.

4.3.4 Approach to Assessment of Effects

The chapter assesses the likely construction, operational and decommissioning effects on:-

- the local economy (employment and economic output);
- the local population;
- opportunities for local involvement in the business supply chain and employment, i.e. how the key construction and operational activities will translate into investment;
- recreation and tourism assets; and,
- land use, through possible effects arising from improved access to the countryside.

Decommissioning phase effects are assessed as being largely similar to construction effects.

4.3.5 Sensitivity Criteria, Magnitude and Significance Thresholds

Likely effects will be assessed in line with the following parameters:-

- beneficial or adverse (or neutral);
- extent (the area over which the effect occurs);
- likelihood (i.e. likely or unlikely); duration (the time for which the effect is expected to last prior to recovery or replacement of the resource or feature);
- reversibility (permanent or temporary); and,
- timing and frequency.

4.3.6 Sensitivity Criteria

There are no published standards that define receptor sensitivity relating to population and human health assessments. As a general rule, the sensitivity of each receptor or receptor group is based on its importance or scale and the ability of the baseline to absorb or be influenced by the identified effects. In assigning receptor sensitivity, consideration is given to the following:-

- importance of the receptor e.g. local, regional, national, international;
- availability of comparable alternatives;
- ease at which the resource could be replaced;
- capacity of the resource to recover or adapt to identified impacts over a period of time; and,
- level of usage and nature of users (e.g. sensitive groups such as people with disabilities).

Based upon expert judgement, four levels of sensitivity are used: High; Medium, Low and Negligible. Proposed sensitivity criteria are set out in **Table 4.3** below.

4.3.7 Magnitude Criteria

The magnitude of impact is evaluated based on the change that occurs with respect to the baseline conditions. Four degrees of magnitude are used: High, Medium, Low, and Negligible.

4.3.8 Defining Significant Effects

The level of an effect is assessed by combining the magnitude of the impact and the sensitivity of the receptor as shown in **Table 4.3**. Four levels of effect are used: Negligible, Minor, Moderate or Major.

Where an effect is classified as Major, this is considered to represent a 'significant effect' in terms of the EIA Directive. Where an effect is classified as Moderate, this may be considered to represent a 'significant effect' but is subject to expert judgement and interpretation, particularly where the sensitivity or impact magnitude levels are not clear or are borderline between categories or the impact is intermittent.

Sensitivity or Value of Resource or Receptor	Magnitude of Impact			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

Table 4.3: Level of Effect Matrix

4.3.9 Approach to Mitigation

Mitigation measures, additional to those environmental measures incorporated into the project design, are considered in order to mitigate any likely significant adverse effects that are identified through the assessment process.

4.3.10 Cumulative Effects

Consideration will be given to the likely cumulative effect of the project in combination with other existing, permitted and proposed developments, including those set out at **Chapter 1**.

4.3.11 Limitations of Assessment

Certain information, in particular information regarding capital expenditure and construction employment, will not be available until the normal procurement process has been completed. The following chapter provides estimates, based on experience on other projects, of likely spend and employment during construction sufficient to allow assessment in this EIAR.

Information on inter-related effects is informed by the assessments undertaken on other topics, which are set out in those topic chapters. Any limitations are set out in those chapters.

The status of certain individual receptors, for example, accommodation businesses, may be subject to change. Information reported in this chapter is based on the baseline survey work described in **Section 4.4**.

4.4 Description of Existing Environment

4.4.1 Wider Study Area

4.4.1.1 Population

The most recent estimates show that the current population of County Carlow stands at 56,932, which is less than 1.2% of Irelands total population (CSO, 2016); while County Kilkenny's population is estimated at 99,232 which is c. 2.1% of Ireland's population as a whole of 4.76 million.

4.4.1.2 Labour Market/Education and Skills

2016 Census data for County Carlow indicates that there were 21,973 persons aged 15 years and over whose principal economic status was 'at work', whilst 434 were looking for their first job and 4,073 were unemployed having lost or given up their previous job. The overall unemployment rate stood at 9%.

2016 Census data for County Kilkenny indicates that there were 41,363 persons aged 15 years and over whose principal economic status was 'at work', whilst 578 were looking for their first job and 5,466 were unemployed having lost or given up their previous job. The overall unemployment rate stood at 7%

4.4.1.3 Business Diversity and Supply Chain

Data on an area's business population can be obtained from the CSO census data. This data source can be used to identify the structure of the local business base by sector. This is potentially useful in assessing the capacity of the local area to host supply chain activity for infrastructure and other large-scale construction projects such as the subject project. **Table 4.4** provides the latest (2016) data on the structure of the local business base, both in absolute and relative terms.

Industry	Carlow 2016		Kilkenny 2016	
Managers, Directors and Senior Officials	1,741	6.7%	3,487	7.4%
Professional Occupations	3,329	12.8%	7,602	16.2%
Associate Professional and Technical Occupations	2,276	8.7%	4,390	9.4%
Administrative and Secretarial Occupations	2,189	8.4%	4,298	9.2%
Skilled Trades Occupations	4,575	17.6%	9,011	19.2%
Caring, Leisure and Other Service Occupations	1,981	7.6%	3,807	8.1%
Sales and Customer Service Occupations	1,811	7.0%	3,119	6.7%
Process, Plant and Machine Operatives	2,175	8.4%	3,336	7.1%
Elementary Occupations	2,577	9.9%	4,146	8.9%
Not stated	3,392	13.0%	3,633	7.8%

Industry	Carlow 2016		Kilkenny 2016	
Total	**26,046**	-	**46,829**	-

Table 4.4: Persons at work or unemployed by occupation

Source: CSO Census Data 2016 (CSO, 2017)

The data in **Table 4.4** shows that 'Skilled Trades Occupations', 'Professional Occupations', and 'Elementary Occupations' have the highest percentage of the work force; while 'Not Stated' comprises almost 21% of the workforce.

4.4.1.4 Visitor Economy

Fáilte Ireland combines counties together to form 7 no. different regions across Ireland for which tourism statistics are produced. County Carlow and County Kilkenny part of the 'South East' region along with Waterford and Wexford.

The latest data for the South East region was published in 2019 and indicates that:-

- there was a total of 945,000 overseas visitor trips to the region, generating approximately €261million;
- there was a total of 1,795,000 trips by Irish residents to the region generating approximately €312million; and,
- there was a total of 53,000 trips by residents from Northern Ireland to the region generating approximately €21million.

The policies contained within the Carlow CDP 2022-2028 and the Kilkenny CDP 2021-2027 are also focussed on developing the counties as tourism destinations.

The Carlow CDP 2022-2028 sets out that the county has a wide range of historical, cultural and landscape interests that have the potential to raise the county's profile as a significant tourist destination. In particular, the Carlow CDP 2022-2028 notes that the county's appeal is recognised and benefits from the promotion of Fáilte Ireland's 'Ancient East' brand which encompasses the rich heritage and cultural assets that Ireland has to offer.

Policies within the Carlow CDP 2022-2028 are focussed on promoting the development of greenways and blueways at appropriate locations and supporting the provision of small-scale complementary facilities and businesses along these greenways and blueways to enhance user experience. The Carlow CDP 2022-2028 refers to the 'Barrow Valley Greenway' which, if viable, would significantly boost the appeal of tourism in the county and provide possibilities for linkages with similar infrastructure in adjoining counties. There are also policies to enhance and support opportunities for the use of the county's uplands and waterways, including the River Barrow and the River Slaney, such as recreational activities, boat storage and rest areas.

Further amenity or tourism attractions located within Co. Carlow include:-

- Ducketts Grove House;
- Lisnavagh House;
- Hardymount House & Gardens;
- Altamount Gardens;
- Huntington Castle;
- Borris House;
- Kilgraney House;
- Oak Park Forest Park;

- Clogrennane Woods;
- St. Mullins Ecclesiastical Village;
- Carrigbeg Riding Stables;
- Clashganny River Adventures;
- Gordon Bennett Route;
- Carlow-Kilkenny National Cycling Route; and,
- Barrow Way

The Kilkenny CDP 2021-2027 refers to recent developments that are to be encouraged and supported within the tourism sector. These projects include the 'Kilkenny Greenway' and 'Thomastown' while the continued development of Mount Juliet as a unique luxury destination, and the recent addition of Mountain View in Ballyhale, offer accommodation for visitors to the area.

Within the Kilkenny tourism sector, recent developments that are to be encouraged within the Kilkenny CDP 2021-2027 include:-

- Callan – Cultural Hub;
- Castlecomer Discovery Park;
- Graiguenamanagh Hub;
- Inistioge and Woodstock Estate; and,
- Kilkenny Greenway.

Further amenity or tourism attractions located within Co. Kilkenny include:-

- Kilkenny Castle & Gardens;
- National Design & Craft Gallery;
- St. Mary's Cathedral;
- St. Canice's Cathedral & Round Tower;
- The Black Abbey;
- Dunmore Cave;
- Jerpoint Abbey;
- Knockroe Passage Tomb;
- Castlecomer Discovery Park;
- Shankill Castle;
- Kilfane Glen & Waterfall;
- Carlow-Kilkenny National Cycling Route;
- North Kilkenny Cycle Loop;
- East Kilkenny Cycle Loop; and,
- Nore Valley Walking Route.

4.4.2 Local Study Area

The following section describes the baseline environment for the Local Study Area (LSA) i.e. within 5km of the boundary for the wind farm and 500m of the grid connection. As set out at **Section 4.3.2**, this component of the baseline covers:-

- Community;
- Recreation;
- Visitor economy assets; and,
- Land use.

4.4.2.1 Community

The wind farm is located in in west County Carlow and east County Kilkenny; with Oldleighlin, being located c. 4km southeast, being the only notable settlement located within the LSA; however, it is noted that a number of nucleated clusters exist

at crossroads/junctions (e.g. The Ridge and The Butts).

The settlement of Oldleighlin is identified as a Tier 5 'Smaller Serviced Rural Village' in the Carlow CDP 2022-2028 which are classified as:-

> *"Villages with more limited services established populations <200 and settlement structure which provide important local level services and community facilities."*

The Carlow CDP 2022-2028 sets out that the population of the 'Smaller Serviced Rural Villages' has increased by 271 no. between 2016-2018 and considers that the Core Strategy and Settlement Strategy have made sufficient provision for the continuation of this increasing population trend.

Oldleighlin also contains an ecclesiastical heritage feature with national significance known as the St. Laserian's Medieval Cathedral, which is likely to play a role in the visitor economy of the LSA. Church Clara, a decayed church and grounds, are located within 500m of the grid connection route. The church graveyard also contains a number of heritage features including an ogham stone, font, and grave slab.

4.4.2.2 Recreation

Given the rural nature of the LSA and the absence of a significant number of settlements; recreational facilities are quite limited

St. Laserian's Cathedral

St. Laserian's Cathedral is a 13th Century monastic settlement that dates from the 7th century that regularly welcomes educational tours and tourists. The grounds include a place of worship and a graveyard. The receptor is assessed to be of local value and therefore sensitivity is low for the purposes of this assessment.

Old Leighlin GAA Club

Old Leighlin GAA Club is located c. 4km east of the wind farm. The facilities include a football playing field and parking. The receptor is assessed to be of local value and therefore sensitivity is low for the purposes of this assessment.

Old Leighlin Basketball Club

Old Leighlin Basketball Club is located c. 4km east of the wind farm. The facilities include an internal playing court and parking. The receptor is assessed to be of local value and therefore sensitivity is low for the purposes of this assessment.

Oldleighlin 1798 Memorial Garden

The memorial garden comprises a small landscaped area and includes a plaque commemorating the 1798 Rebellion. The receptor is assessed to be of local value and therefore sensitivity is low for the purposes of this assessment.

Walking Paths, Trails and Cycling

The National Trails Office (NTO) of Sport Ireland is responsible for all waymarked trails. There are no national waymarked walking or cycling trails which pass through the LSA.

4.4.2.3 Tourism

Accommodation

1 no. accommodation business, the Harmony Hall Veganic, has been identified in

the LSA. There are, however, a small number of self-catering properties rental properties within the LSA which are marketed via third party marketing sites such as Airbnb. The accommodation businesses identified are considered to be of local value and their sensitivity is therefore low.

Land Use

The project site, and the LSA, is predominately used for agricultural purposes and does not provide notable recreational uses.

4.5 Description of Likely Effects

The following sections assess the effects which are likely to arise during the construction, operational and decommissioning phases of the project.

The forestry re-plant lands will be located beyond the extent of the WSA and LSA; however, it is assessed that there is no likelihood of significant effects on population & human health arising at any point during planting activities or during the growth period. While the re-planting of these lands would result in a noticeable alteration to land use within the identified lands, they represent a relatively small consolidated landholding and would not adversely affect population trends or human health levels at a local, regional or national scale. Similarly, it is assessed that there is no likelihood of the re-planting acting in combination with other developments to result in significant adverse effects on population & human health.

4.5.1 Construction Phase

4.5.1.1 Effects on the WSA

Employment and Local Investment

During the 15-18 month construction phase of the project, there will be economic effects resulting from expenditure on items such as site preparation, purchase and delivery of materials, plant, equipment and components. Information provided by the Developer, based on experience at other wind farms in Ireland, indicates that there is expected to be a peak on-site workforce of c. 100 no. workers. It is highly likely that a significant percentage of these workers will be sourced from the local labour market within the WSA, with the remainder being sourced from Ireland as a whole.

The most substantial elements of the project are the 7 no. wind turbines and grid connection infrastructure. The indicative investment sums have been set out in **Table 4.5** providing the breakdown of the total development and capital expenditure required to develop and construct the project. Expenditure comprises approximately €55million for the wind farm element, including turbines, civil engineering works, electrical plant and grid connection.

Item	Description	Cost
Turbines & Other Plant	The activity by wind turbine manufacturers and suppliers, including nacelle/hub component manufacture and assembly and blade and tower manufacture. It includes transport, installation and commissioning but excludes the turbine service/maintenance agreement.	€38 million
Civil Works	The activity by civil contractors and their suppliers; including access tracks and	€7.5 million

	drainage, crane hardstands, turbine foundations, meteorological mast foundations, cable trenches and buildings for electrical switch gear, SCADA equipment and its installation, and a maintenance and spare part facility.	
Electrical Works	The activity by electrical contractors and their suppliers, including cables, electrical switch gear, protection and control system, and grid connection.	€9.5 million
Total		**€55 million**

Table 4.5: Breakdown of Estimated Capital Investment

The procurement of goods and services is likely to have a significant positive effect on the local economy. Of the level of expenditure calculated above, local contract spend (within the WSA) could be in the region of €14 million (c. 25%) over the development and construction period.

The types of supply chain companies that could benefit from this expenditure are wide ranging, and are likely to include, but not limited to, the following:-

- haulage and transport services;
- traffic management;
- materials supply, e.g. aggregates;
- plant and equipment hire;
- vehicle servicing/tyres;
- fencing;
- fuel;
- security;
- waste management;
- building construction, electrical, plumbing, roofing, flooring, plastering and joinery services;
- signage and lighting;
- telecommunications;
- drainage;
- planting and seeding;
- catering;
- professional services; and,
- accommodation.

The appointed contractors will be actively encouraged to develop local supply chains throughout the WSA, and work with local subcontractors and service providers.

In addition, local businesses and services are likely to experience indirect benefits during the construction phase works as the workforce spend locally on living costs whilst they are based in the area. These effects are further explored in the following section.

Effects on Tourism Economy

The construction period is anticipated to last for 15-18 months and, as stated, is likely to benefit the local economy through expenditure on purchases of accommodation, food, drink, fuel, etc. which will be required to sustain the

construction workforce. These beneficial effects would be experienced mainly by businesses already operating within the tourism sector, or those that are partly dependent on tourism for their income, for example the retail sector.

Anecdotal evidence, based on other wind farm construction projects, demonstrates that local businesses such as accommodation providers welcome the enhanced level of occupancy that is achieved due to 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.

The positive effects arising during the construction period are assessed to more than offset any likely temporary negative effects to the tourism economy that may occur in the event that tourist visitors were deterred from visiting the local area (for example, if accommodation was in use by construction workers) during this phase.

Whilst overall effects on the tourism economy are considered to be negligible and not significant (beneficial or adverse), the benefits to individual businesses is likely to be substantial and may indeed be significant. However, until such time as contracts are agreed, it is not possible to quantify the precise level of benefit to individual businesses.

4.5.1.2 Effects on the LSA

Land Use

The project site forms part of operational agricultural holdings and is owned by a number of private landowners. The Developer is in regular dialogue with each landowner and each one has entered into a legal agreement to allow the Developer to utilise the land. The legal agreements include a suite of measures designed to minimise any likely land use effects including the clear identification of lands which may be subject to development, measures to ensure that disturbed lands are reinstated appropriately and returned to agricultural use insofar as possible, and provision for the use of proposed access tracks by landowners during the operational phase of the project. Measures to facilitate the safe continuation of agricultural operations during the construction phase have been developed.

Tourism and Recreation Assets

As the sensitivity of all tourism/recreational receptors within the LSA is assessed to be low, and the magnitude of adverse effects would also be low, the effect on receptors in the LSA would be negligible (adverse) and not likely to be significant. This effect would be further reduced, or may become beneficial overall, if businesses in this area generate additional revenue areas a result of the project.

The impact on businesses within the LSA unaffected by construction traffic would be beneficial although as the sensitivity is low the level of beneficial effect is not expected to be more than negligible. Effects on individual businesses may be higher particularly where they are regularly used by construction staff, as this affords them regular income that is not seasonally dependent. However, until contracts are agreed and construction commences, it is not known which businesses would benefit.

The detailed CEMP, to be prepared prior to the commencement of development, will set out measures to ensure that local residents are informed of the construction work including the location and duration of temporary road closures and the

identification of alternative routes during the construction works. Given the temporary nature of the construction works, the measures to be implemented and the low sensitivity of the receptors, the effect would be negligible and not likely to be significant.

Major Accidents or Natural Disasters

As set out within **Chapter 6** and **Chapter 7** of this EIAR, the project is not recognised to be a likely source of pollution during either the construction or operational phases, predominately due to the limited volume of hydrocarbons stored on site and the bunding arrangements to ensure that spillages do not occur. In the event of an accident on-site, mitigation measures set out in the above chapters will ensure that significant environmental effects do not occur.

There is limited likelihood for significant natural disasters to occur at the project site. Ireland is a geologically stable country with a mild temperate climate. The potential natural disasters that may occur are therefore limited to flooding and fire. The risk of flooding is addressed in **Chapter 7**. It is considered that the risk of significant fire occurring, affecting the project and causing it to have significant environmental effects, is limited. As discussed above, there are no significant sources of pollution from the project with the potential to cause environmental or health effects. Furthermore, one of the core mitigation by design features of the project, maximising the distance to residential dwellings, further limits any likelihood of significant human health effects as a result of accidents or natural disasters.

Major industrial accidents involving dangerous substances pose a significant threat to human health and the environment. Such incidents can give rise to serious injury to local residents or result in damage to the environment, both within proposed development sites and in the vicinity. However, the project site is not regulated by, connected or proximate to any site regulated under the Control of Major Accident Hazards Involving Dangerous Substances Regulations (i.e. sites regulated in accordance with the SEVESO Directives) and so there is no likelihood for cumulative effects or interactions with any such site.

4.5.1.3 Cumulative Effects

This assessment has taken into account the cumulative impact of the project including all elements i.e. wind farm and associated ancillary infrastructure, grid connection and upgrade works to the turbine component haul route.

However, there is potential for cumulative effects to arise in relation to the construction of other permitted or proposed developments should the construction phases overlap with the project. While there are a number of existing, permitted or currently proposed developments within the WSA and LSA, it is assessed that none of these projects are of a sufficient scale or nature to be likely to result in cumulative socio-economic, population, or human health effects.

4.5.2 Operational Phase

4.5.2.1 Effects on the WSA

Employment and Investment

When the project is operational, the project will require a team of personnel to provide servicing, maintenance, repairs and other operational support. It is estimated that up to 4 no. engineers and technicians (full time equivalent) will be needed to provide operational support to the project. All of these staff are expected to be based within the WSA (i.e. County Carlow or Kilkenny).

Further employment is anticipated to be supported directly and indirectly elsewhere in Ireland during the operational phase. Additional to the direct impacts on employment during the operational phase, there will also be indirect effects generated throughout the operational phase. Indirect effects arise from the placing of contracts with other businesses, both in the local area and elsewhere in Ireland, supplying services and materials to the project during its operational phase. Examples of such supply chain activity would include the procurement of:-

- site and building maintenance;
- waste management;
- civil engineering contractors for access track maintenance, ditching, crane hardstanding repairs, grass cutting, and weed control, etc.;
- supply of consumable items (e.g. lubricants and oils, spare parts, office supplies, etc.);
- turbine inspections; and,
- in addition, local shops, cafes, and accommodation providers often experience an increase in business during the operational phase (e.g. extra technicians onsite for during wind farm maintenance and servicing).

The Developer will seek to secure positive benefits for the local economy by encouraging the use of local labour, manufacturers and suppliers where possible during the operational phase.

Visitor Economy

As identified at **Section 4.4**, landscape quality is an important part of the visitor appeal of the WSA and is one of the reasons why visitors come to the area. The landscape qualities are appreciated from several scenic roads and viewpoints which are set out in **Chapter 9.** Local planning policies refer to managing the landscape sympathetically in order to, amongst other reasons, protect this visitor appeal.

Chapter 9 of the EIAR assesses in detail the landscape and visual effects of the project. Visual impacts have been assessed at 26 no. visual receptor locations throughout the study area, with sensitivity ranging widely from 'High' to 'Low'. Those locations with the highest levels of sensitivity (high/high-medium) tend to be sensitive heritage features such as the Round Tower at St Canice's Cathedral and the heritage settlement of Kilkenny, the River Barrow and scenic designations that afford broad views across the landscape. Other views with medium sensitivity typically relate to other scenic designations in the respective County Development Plans that are influenced by a range of working rural land uses. The majority of the viewpoints have been classified as 'medium-low' and lower sensitivity designations which reflect the working nature of this relatively typical landscape.

The highest level of impact significance occurs within the LSA (referred to as the 'central study area' at **Chapter 9**) and represents views likely to be experienced by the local community (within 5km). Outside of the LSA, the significance of impacts considerably reduces and ranges between 'slight' and 'imperceptible' due to the robust working nature of this landscape context which is not assessed to be highly sensitive or susceptible to development. The chapter concludes that the project will not give rise to significant landscape and visual effects in EIA terms.

Evidently, whilst the project will be visible within the WSA, significant visual impacts (as assessed in **Chapter 9**) will not occur. The more prominent views of the wind farm will occur much closer to the site in areas where there is little evidence of significant

visitor economy activity. A negligible impact resulting in a negligible effect on tourism is likely to occur.

Notwithstanding these considerations, it is noted that there is no evidence to suggest that an occasional view of the project from within the WSA might adversely affect the visitor appeal of the area. Based on the evidence gathered from previous studies, the occasional views of the project are not expected to act as a deterrent to visitors or discourage repeat visits to the area.

4.5.2.2 Effects on the LSA

Community Benefit Funds and Community Investment

The operation of the project will bring about a number of financial benefit packages to both the WSA and LSA. These packages include investment opportunities, community benefit funds, contributions to local resident energy costs, payment of business rates to Carlow County Council and Kilkenny County Council and rental income accrued by involved landowners. Each of these packages is discussed below.

The Developer is committed to operating a community benefit fund in accordance with Wind Energy Ireland (WEI) best practice procedures and it will be available to the community at a rate of €2 euro per megawatt hour (MWh) produced, should the project qualify for the Renewable Energy Support Scheme (RESS). Therefore, an investment of approximately €260,000 (or c. €37,000 per turbine) per year for up to 15 years, is committed to by the Developer. There will also be a community investment element available where there will be an opportunity for all local residents to participate, should they wish to do so. The structure for the investment scheme will form part of the RESS design.

The community benefit fund will be administered by a committee set up by the operations department of the Developer and will comprise members from the local community. This will allow the local community to prioritise the fund and target the projects which are of local importance. Local community groups will be invited to submit funding requests to the committee and preference will be given to local projects, thereby contributing to the vitality of the local population, and to projects which are considered to represent an environmental benefit or incorporate a renewable energy element/aspect.

The Developer has also committed to introducing a Neighbour Scheme which will offer electricity bill payers living within 1km of a wind turbine an annual contribution of €1,000 towards their electricity usage.

Based on current rates, the project would make an annual business rates payment of €420,000 to Carlow County Council and €315,000 to Kilkenny County Council. These annual payments to the local authorities will have far reaching benefits across the entirety of the respective counties, including within the LSA.

Additionally, it should also be noted that, over the lifetime of the development, a substantial investment will have been made to involved landowners. It is highly likely that these landowners will reinvest a significant proportion of this sum into the local economy and supply chains through various means which will, in turn, result in further community gains.

Benefits will accrue in the LSA as a result of this overall spend/investment and, depending on the choices made, could have a positive effect on the physical and mental well-being of local residents as well as economic benefits.

The long-term nature of the income would allow the community to plan ahead, to draw in other sources of match funding to maximise the benefits and investment projects could be designed to target local priorities. Given the annual contributions, the magnitude of impact is assessed to be 'High'. This would result in a positive effect of moderate or major importance on the study area.

Other effects within the LSA

Based on a review of the findings of the assessment in **Chapter 13**, no significant effects are likely as a result of maintenance vehicles accessing the site as this would be on an occasional basis only and would not significantly increase vehicular movements in the local area.

There would also be some minor beneficial effects on local businesses within the LSA, probably most likely around Oldleighlin arising from expenditure on goods and services by staff and suppliers employed at the project site. This is expected to benefit local shops and food & drink businesses. Although the expenditure would be intermittent and is difficult to quantify, the benefit would be enhanced by the fact that workers visiting the project would do so all year round, unlike tourism expenditure which tends to be seasonal.

Visual effects on recreational receptors are assessed in **Chapter 9** and the findings have been taken into account in the assessment below, although it is important to note that a significant landscape and visual effect does not necessarily result in a significant effect on population & human health. In assessing effects, there is not a straightforward relationship between users experiencing views of turbines from a point or along a route (for example a passing cyclist) and impacts on usage. Some people may be discouraged from using the receptor due to the presence of turbines, but for others there may be no impact.

The assessment of landscape and visual effects finds that the greater effects of the project will be contained within a relatively limited area around the site (local community views only), and the magnitude of effects would dissipate with distance. These visual effects would not result in any significant adverse effects any of the receptors identified in the baseline description.

4.5.2.3 Human Health

Noise

During the construction and operational phases of the project, noise levels sufficient to cause noise induced hearing damage or sleep disturbance are not likely to occur. The full results of this assessment are presented in **Chapter 11**, Noise and Vibration.

Lighting Protection

Appropriate lightning protection measures are incorporated in modern wind turbines to ensure that lightning is conducted harmlessly past the sensitive parts of the nacelle and down into the earth. The rotor blades of the wind turbine model are equipped with lightning receptors mounted in the blade. The turbine is grounded and shielded to protect against lightning. In the event of a lightning strike or an abnormal increase in voltage (overvoltage), the entire electrical and electronic equipment is protected by built-in energy absorbing components with surge protection in the electrical components.

Lightning protection is also incorporated into the design of the electricity substation and meteorological mast.

Ice Fall

In extremely cold climates or at high altitude, ice can potentially build up on blades or other parts of the turbines. Ice can potential fall off and cause injury although there is no experience of any such incident in Ireland. Most modern turbines are fitted with anti-vibration sensors, which will detect any imbalance caused by the icing of the blades. The sensors will cause the turbine to wait until the blades have been de-iced prior to beginning operation. All occupied/habitable properties in the vicinity of the wind farm are located sufficiently distant from a wind turbine and therefore there is no likely impact in respect of ice throw.

Electromagnetic (EMF) Interference

All electricity, both natural and man-made, produces two types of fields: electric fields and magnetic fields. The on-site electricity cables and grid connection electricity lines will comply with the international guidelines for ELF-EMF set by the International Commission on Non-Ionizing Radiation Protection (ICNRP), which is an advisory agency to the World Health Organisation. The cables will also comply with EU guidelines for human exposure to EMF. In addition, all electricity lines/cable will be located below-ground, thus avoiding any likelihood of significant adverse EMF effects.

The electricity substation is located in excess of 200m from any residence with no possible EMF impact. The substation will also comply with ICNIRP and EU guidelines relating to exposure to EMF.

Shadow Flicker

Shadow flicker is assessed in detail in **Chapter 12**. While, in the absence of mitigation measures, shadow flicker is predicted to be experienced at dwellings; the Developer has committed to the implementation of technological measures such that no dwelling will actually experience any shadow flicker. This commitment can be achieved by switching off the wind turbines, if the sun is shining, at predetermined times when shadow flicker is predicted to occur. This process can be completed by software installed within the turbines computer system.

Accordingly, the assessment concludes that there will be no significant residual shadow flicker effects arising from the project.

4.5.2.4 Cumulative Effects

While there are a number of existing, permitted or currently proposed developments within the WSA and LSA, it is assessed that none of these projects are of a sufficient scale or nature to have the likelihood to result in in-combination socio-economic or population and human health effects during the operational phase of the project.

4.5.3 Decommissioning Phase

These effects are anticipated to be the same as the construction phase effects described above.

4.6 Mitigation & Monitoring

4.6.1 Construction Phase

Allowing for the implementation of embedded mitigation set out elsewhere within this EIAR, no likely significant adverse effects have been identified in respect of socio-economic receptors arising from construction of the project and therefore no mitigation measures are required to reduce or remedy any adverse effect. In terms

of beneficial effects, individual businesses or receptors may experience substantial effects accruing from the construction phase; however, it is assessed that the overall effect on socio-economic receptors will not be significant.

As identified above, a suite of measures has been agreed with involved landowners regarding the management of agricultural activities during the construction phase. These measures have been incorporated into signed legal agreements and will be implemented in full.

4.6.2 Operational Phase

No likely significant adverse effects have been identified in respect of socio-economic receptors arising from the operation of the project and therefore no mitigation measures are required to reduce or remedy any adverse effect.

Mitigation measures proposed elsewhere in this EIAR; including in respect of water protection, noise minimisation, and the avoidance of shadow flicker will ensure that significant population or human health effects do not occur.

4.6.3 Decommissioning Phase

No likely significant adverse effects have been identified in respect of socio-economic receptors arising from the decommissioning of the project and therefore no mitigation measures are required to reduce or remedy any adverse effect.

4.7 Residual Effects

4.7.1 Construction Phase

No significant residual adverse construction effects are assessed as likely to occur.

4.7.2 Operational Phase

No significant residual adverse operational effects are assessed as likely to occur.

4.7.3 Decommissioning Phase

No significant residual adverse decommissioning effects are assessed as likely to occur.

4.8 Summary

The assessment undertaken in this chapter has evaluated data from a range of sources, including the findings and conclusions of other assessments within this EIAR, to determine the likely effects of the project on population and human health. In order to avoid 'double-counting', the assessment focuses on those factors which might result in economic, social, and health and safety effects. Other specific assessments on population and human health, including, for example, in respect of noise, visual impact and air quality, are assessed separately elsewhere in this EIAR and we refer to the respective chapters for full details.

The overall conclusion of this chapter is that any adverse effects of the project on population and human health are assessed as unlikely to be significant. No specific mitigation measures, other than full adherence to all health and safety and public health guidance, have therefore been identified as being required.