STATKRAFT

ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED DERNACART WIND FARM, COUNTY LAOIS

VOLUME 2 – MAIN EIAR

CHAPTER 6 – POPULATION, HUMAN HEALTH & MATERIAL ASSETS

DECEMBER 2019

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TABLE OF CONTENTS

TABLE OF CONTENTS

Page

LIST OF FIGURES

Page

LIST OF TABLES

6 POPULATION, HUMAN HEALTH & MATERIAL ASSETS

6.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) examines the potential effects of the proposed wind farm development on Population, Human Health and Material Assets.

This chapter includes a description of the existing environment and the likely effects on population, human health and material assets arising from the proposed development to include:

- Population;
- Socio-Economics, Employment and Economic Activity;
- Land Use;
- Recreation, Tourism, & Amenity;
- Human Health including Health and Safety;
- Renewable and Non-Renewable Sources, and Utility Infrastructure.

Potential effects of other aspects associated with the proposed development, such as air quality, noise, traffic, shadow flicker, and landscape and visual impacts on population, human health and material assets (to include renewable and non-renewable sources, and utility infrastructure) are addressed separately in Chapters 16, 8, 10, 7, and 11 of Volume 2 of this EIAR. Potential hydrological and water quality impacts are discussed in Chapter 14 and potential impacts to lands, soil and geology are discussed in Chapter 13 of this EIAR.

Material assets relating to transport infrastructure are dealt with in Chapter 10: Traffic and Transportation. Material assets with respect of natural resources are considered in Chapter 13: Lands, Soil and Geology, Chapter 14 Hydrology and Water Quality, Chapter: 16 Air Quality and Climate, and Chapter 12: Biodiversity. Assets of Archaeological, Architectural, and Cultural Heritage are considered in Chapter 15 of Volume 2 of this EIAR.

Chapter 17 of this EIAR details an assessment of the interaction of environmental factors.

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

The 'study area' selected for the population and human health section of this EIAR was the area defined in terms of Electoral Division (ED). The site of the proposed development lies within the ED of Graigue. The ED comprises of a total land area of 1,300 ha. The site location and study area are identified in Figure 6-1 below. The cable route passes through the following EDs: Ballybrittas, Emo, Graigue, Hammerlane, Killmullen, Portarlington South.

6.2 Methodology

The chapter has been prepared following a review of the National Planning Framework 2040, Laois County Development Plan 2017 – 2023 and Offaly County Development Plan 2014 – 2020.

Socio-economic and demographic data has been sourced from the Central Statistics Office (CSO)'s Census of Ireland and Census of Agriculture (2010) records. Demographic information relating to the State, the County (Laois), and the 'Study Area' (identified as the Electoral Division – ED for which the site boundary is contained within) has been assessed to establish the existing demographic trends. With regard to the cable route the socio-economic and demographic study has been scoped out due to the nature of the works required for the grid route.

Eircode data (2017) has been assessed to identify any commercial or residential receptors in proximity to the proposed wind farm development. The Eircode data was supplemented by a house survey which ensured that any dwelling constructed since 2017 was also included in the assessment This information has informed the considerations on existing populations within the immediate environs of the proposed development and allows for a comprehensive assessment of the potential effects of the project during construction, operational and decommissioning phases.

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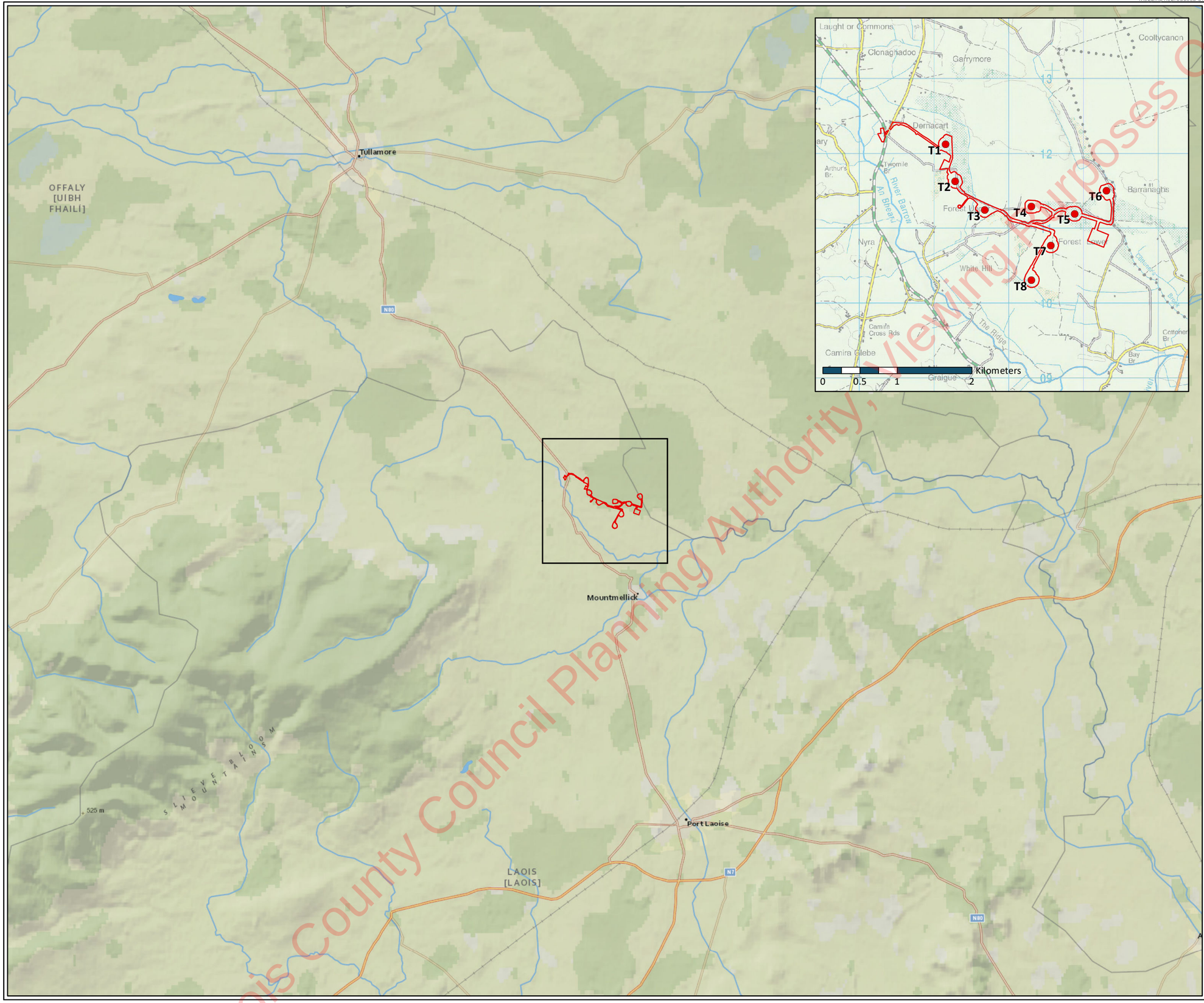

TITLE:	Site Location		
PROJECT:	Dernacart Wind Farm		
FIGURE NO:	6.1		
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The assessment of impacts on human health has regard to the US Environmental Protection Agency's (EPA US) Human Health Risk Assessment process which provides information with regard to potential human health impact as outlined in the Irish Environmental Protection Agency (EPA) Consultation Draft of Advice Notes for Preparing Environmental Impact Statement (EPA, 2015).

The EPA's Guidelines on the information to be contained in Environmental Impact Assessment Reports (2017) and the 2015 Advice Notes for Preparing Environmental Impact Statements, have been considered in the preparation of this EIAR.

As outlined in Chapter 5: Consultation, prior to preparing the EIAR, statutory authorities and other relevant bodies were consulted. Key items of relevance to Population, Human Health and Material Assets, as raised by these parties have been addressed and referenced within this chapter of the EIAR where deemed relevant. The consultation responses received have been given due consideration in the formation of this chapter.

Consultation responses of pertinence to the population, human health and material assets assessment were received from Fáilte Ireland. With regard to Recreation, Amenity and Tourism, Fáilte Ireland have published a guideline on tourism and environmental impacts in 2011 entitled 'Guidelines on the Treatment of Tourism in an Environmental Impact Statement'. This document has been considered, as recommended by Fáilte Ireland during the consultation and is referred to in Section 6.6 of this chapter specifically.

In relation to cumulative impacts on population, human health, and material assets, the potential effects of the proposed development in combination with other proposed or permitted developments (that are yet to be constructed or are currently under construction) or plans, coinciding with this project have been assessed. Projects that have been considered include those identified from a planning search for any major infrastructure projects within 20km of the proposed development, developments within the immediate environs of the site boundary and/or large residential, renewable energy or commercial developments as well as relevant plans for the area as detailed in Chapter 3: Policy.

6.3 Population

This section provides an overview of the population profile for the area, Laois, Offaly and the State between 2006 and 2016 in order to provide for an assessment of the potential impact of the proposed development on the demography of the area.

The proposed wind farm development is in the Electoral Division (ED) of Graigue and this has informed the '*study area*' definition for analysing CSO Census information.

The grid connection from the proposed wind farm to the Bracklone substation passes through the following Electoral Divisions: Graigue, Hammerlane, Emo, Ballybrittas, Portarlington South & Killmullen. The development of the proposed grid route would have no impact on the population demographics of the above listed Electoral Divisions. For this reason, the demographics of these Electoral Divisions have not been assessed in further detail.

6.3.1 Existing Environment

The main towns and villages within the vicinity of the proposed development are as follows[1]:

- Mountmellick, Co. Laois is located approximately 2.2 km south of the closest turbine
- Rosenallis, Co. Laois is located approximately 4.1 km south of the closest turbine
- Portarlington, Co. Laois is located approximately 7.5 km south of the closest turbine
- Fairgreen, Co. Laois is located approximately 6.6 km south of the closest turbine
- Portlaoise, Co. Laois is located approximately 10.2 km south of the closest turbine

Within 1km of the proposed turbines there are 29 no. residential receptors and 1 no. residential and commercial receptors.[2] Figure 6-2 below illustrates the receptors within the vicinity of the proposed wind farm development.

[1] Based on straight line distances
[2] Note that the number of receptors derived for the Shadow Flicker Assessment is based on 10x rotor diameter and for the Noise and Vibration Assessment is based on receptors within the 35dB contour

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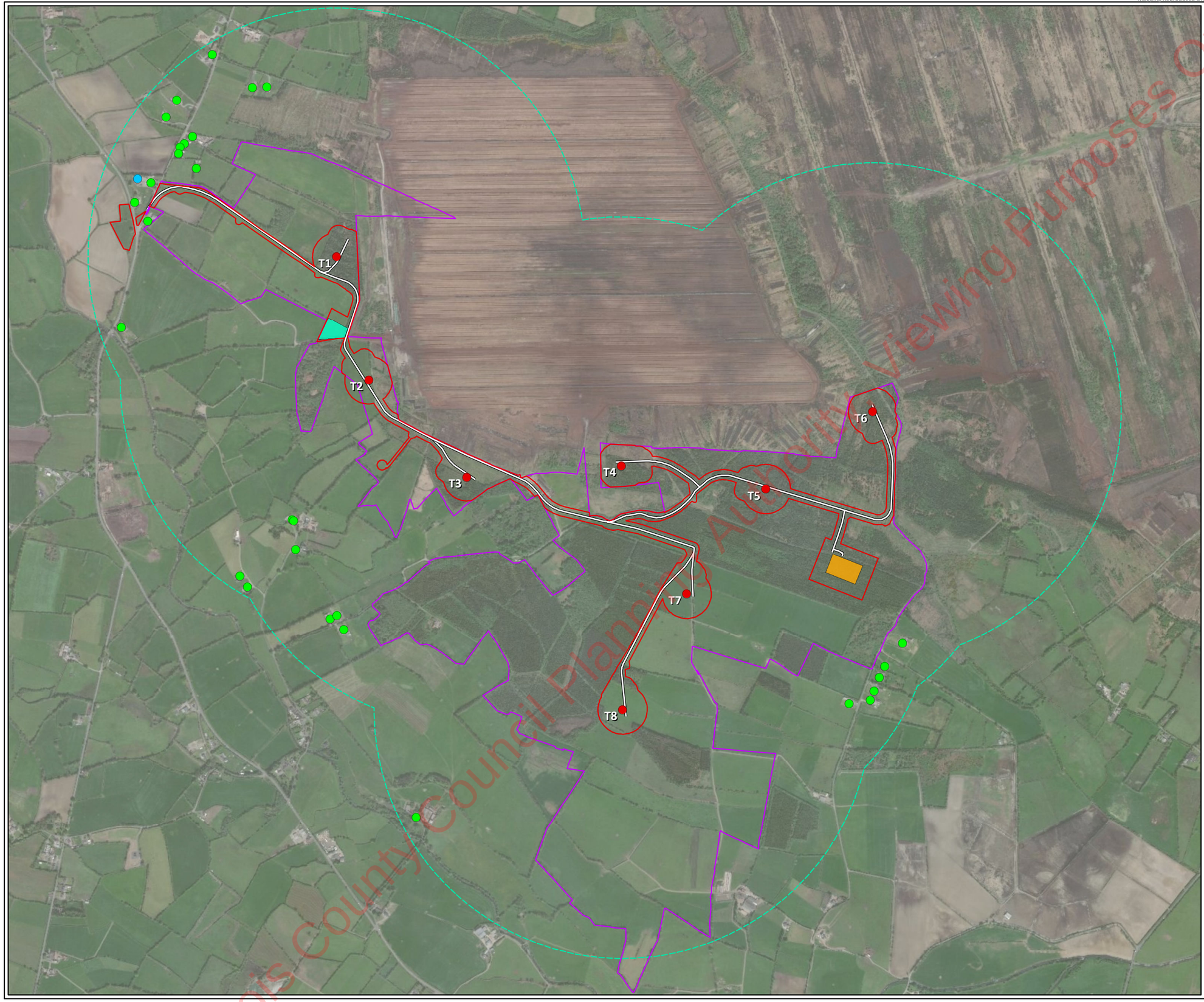

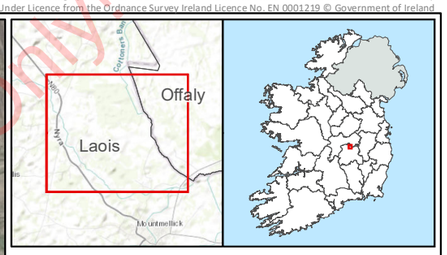

- Proposed Turbines
- Proposed Planning Boundary
- Study Area Boundary
- 1km Distance from Turbines
- Proposed Access Tracks
- Proposed Substation
- Proposed Temporary Compound

Receptors

- Dwelling
- Commercial

N W E S

0 0.25 0.5 1 Kilometers

TITLE:	Receptors within the Vicinity of the Proposed Development		
PROJECT:	Dernacart Wind Farm		
FIGURE NO:	6.2		
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Population statistics for the State, Laois, Offaly and the 'Study Area' (Graigue ED) are set out in Table 6-1 below. Figure 6-3 overleaf identifies the percentage population change of the Study Area (Graigue ED).

Table 6-1: Population 2006-2016

	Population			% Population Change		
Area	**2006**	**2011**	**2016**	**2006-2011**	**2011-2016**	**2006-2016**
State	4,239,848	4,588,252	4,761,865	8.2%	3.8%	12%
Laois	67059	80559	84,697	16.76%	4.89%	20.82%
Offaly	70868	76687	77,961	7.59%	1.63%	9.10%
Graigue ED (Study area)	206	182	183	-13.19%	0.55%	-12.57%

The data presented in Table 6-1 demonstrates that the population of the study area decreased by 13.19% between 2006 and 2011, and increased by 0.55% between 2011 and 2016, demonstrating an overall decrease of 12.57% over a 10-year period. This decrease is not consistent with the population trends witnessed across Laois County which experienced an overall increase in population of 20.82% between 2006 and 2016.

The population of Laois has had a higher percentage increase from 2006 to 2016 than the State's population growth, as opposed to the Study Area which has had a negative population growth average. The higher growth rate encountered in Laois than that on a national scale can be attributed to the influence of the greater Dublin region on neighbouring counties.

Unlike Laois, the population of Offaly had a lower percentage increase from 2006 to 2016 than the State's population growth. This could be attributed to the greater travel time and accessibility to Dublin compared with Laois.

Population Density

The population densities recorded within the State, Laois, Offaly and the Study Area during the 2011 and 2016 Censes are set out hereunder in Table 6-2. The population density of the study area has marginally increased from 14.01 persons per square kilometre in 2011, to 14.3 persons in 2016. The population density of the study area is lower than the population density of Laois overall (which increased from 46.86 persons in 2011 to 49.27 persons per square kilometre in 2016), and of the State (which increased from 67 persons in 2011 to 70 persons per square kilometre in 2016). The population density of Offaly experienced a more modest increase from 38.44 persons in 2011 to 39.08 persons per square kilometre in 2016. Given the study area is bound by the Offaly county boarder its lower growth in population density is more similar to that of Co. Offaly than the larger increase within Co. Laois and the State from 2011 to 2016.

Figure 6.4 demonstrates the population density for the surrounding ED.

Table 6-2: Population Density between 2011 – 2016

Area	Population Density (Persons per square kilometre) 2011	Population Density (Persons per square kilometre) 2016	Percentage Difference between 2011 and 2016
State	67.0	70.0	4.48%
Laois	46.86	49.27	5.15%
Offaly	38.44	39.08	1.66%
Study area	14.01	14.30	2.01%

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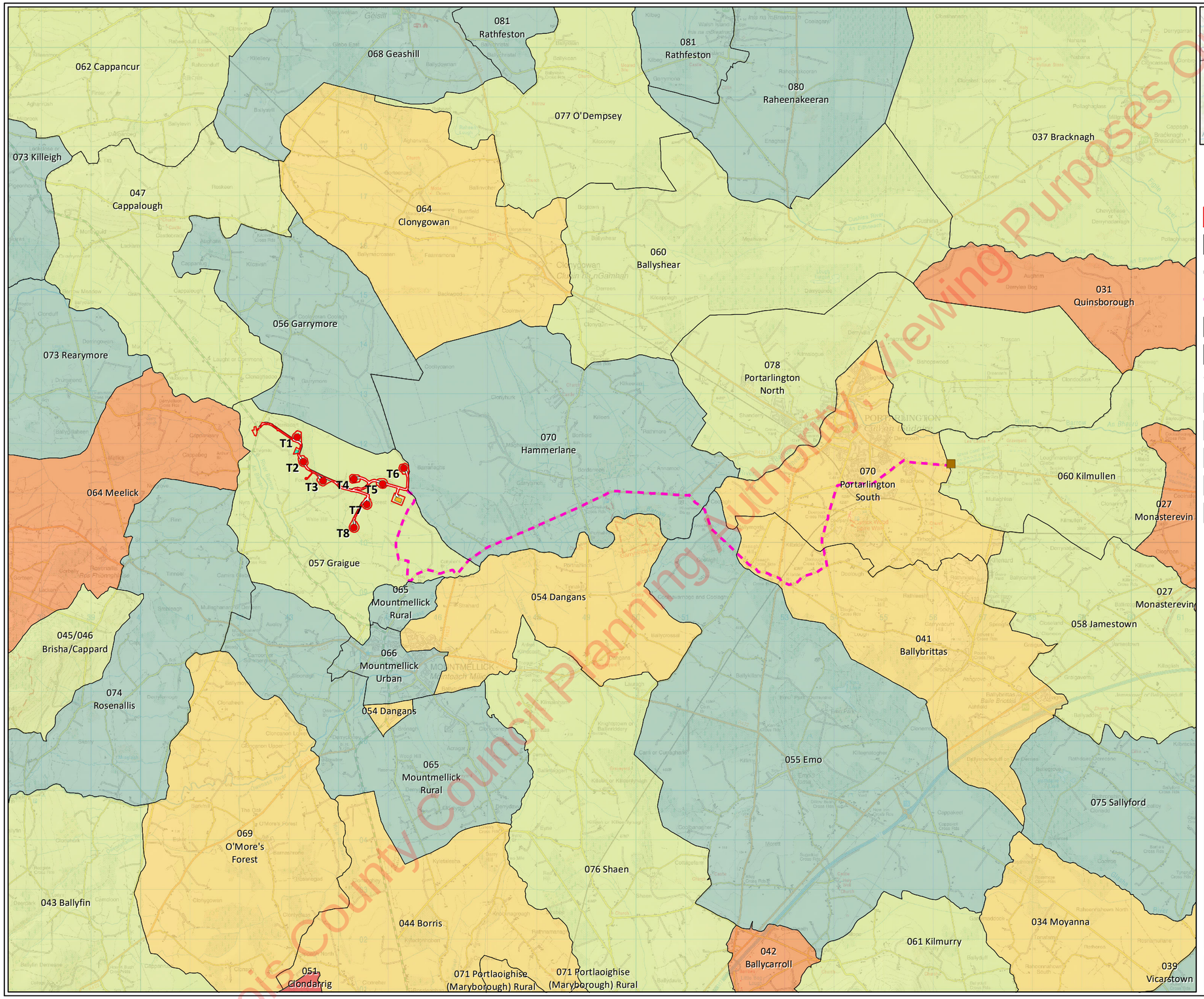

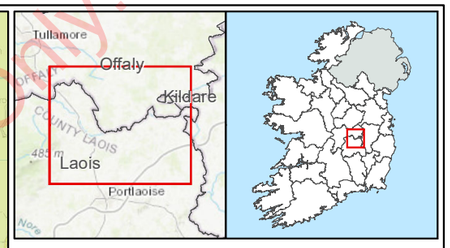

- Proposed Turbines
- Proposed Future Bracklone Substation
- Proposed Planning Boundary
- Electoral Divisions
- Proposed Access Tracks
- Proposed Grid Connection Route
- Proposed Substation
- Proposed Temporary Compound

% Population Change 2011-2016

- -10 - 0
- 0 - 5
- 5 - 10
- 10 - 20
- 20 - 69

N W E S

0 0.5 1 2 Kilometers

TITLE:	Percentage Population Change of ED within the Study Area		
PROJECT:	Dernacart Wind Farm		
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DATE:	30/01/2020	**PAGE SIZE:**	A3

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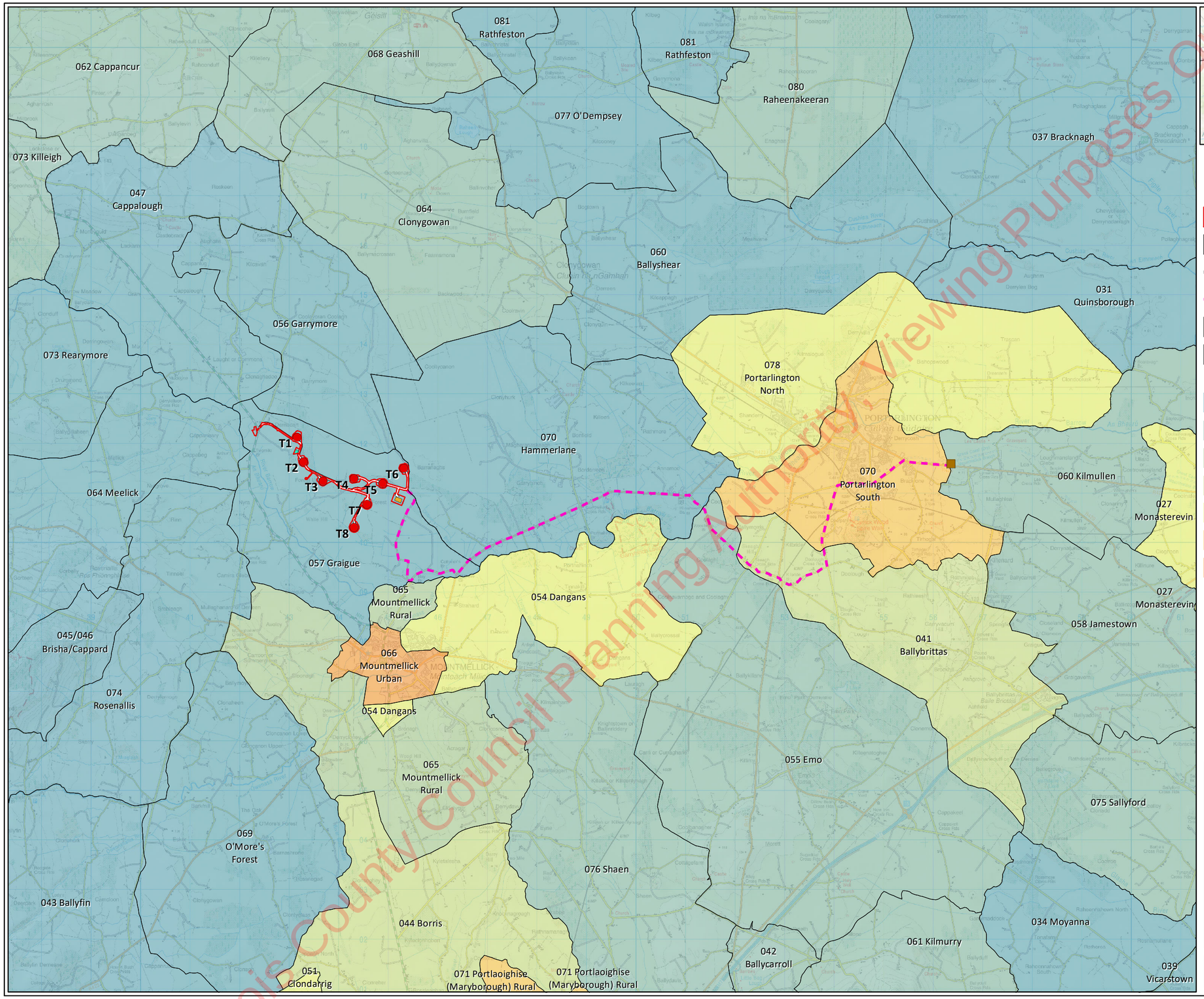

TITLE:	Population Density of ED within the Study Area
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FIGURE NO:	6.4
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6.3.1.1 Household Statistics

Table 6.3 sets out the number of households and average household size (in persons) for the State, Laois, Offaly and the Study Area for 2011 and 2016.

Table 6-3: Number of Households and Average Household Size 2011-2016

Area	2011		2016	
	No. of Households	Avg. Size (persons)	No. of Households	Avg. Size (persons)
State	1,654,208	2.73	1,702,289	2.75
Laois	28,020	2.85	29,107	2.87
Offaly	26,750	2.85	27,343	2.84
Study area	71	2.76	70	2.71

The total number of households within the study area marginally decreased from 71 to 70 between the 2011 and 2016 Census, representing a decrease of 1.43%. There was a 3.73% increase in the number of households in Co. Laois, a 2.22% increase in Co. Offaly and a 2.82% increase in the number of households across the State. Average size of households (in persons) for the Study Area decreased from 2.76 persons to 2.71 persons per household between 2011 and 2016, with average household size (in persons) rising from 2.73 persons to 2.75 between 2011 and 2016 for the State. The average household size (In persons) of 2.71 for the Study Area was lower than that of Co. Laois of 2.87 in 2016.

Age Structure

The age structure of the Study Area in 2011 and 2016 are shown in Tables 6-4 and 6-5 below. There was a higher proportion of people aged 45-64 within the study area compared with the rest of Co. Laois, Offaly and the state. Also, there was a lower proportion of people aged 25-44 within the study area.

Table 6-4: Percentage Population per Age Category in 2011

Area	Age Category 2011				
	0-14	15-24	25-44	45-64	65+
State	21%	12%	32%	23%	12%
Laois	25%	12%	32%	21%	10%
Offaly	23%	12%	30%	23%	12%
Study Area	18%	10%	21%	36%	15%

Table 6-5: Percentage Population per Age Category in 2016

Area	Age Category 2016				
	0-14	15-24	25-44	45-64	65+
State	21%	12%	30%	24%	13%
Laois	25%	11%	30%	23%	11%
Offaly	23%	12%	27%	24%	14%
Study Area	19%	8%	20%	34%	19%

The study area in 2016 had relatively more people aged 45+ than Co. Laois, Offaly and the state, and less people aged under 24. This population age structure is likely to be related to the rural nature of the area with many younger people moving away to secure employment, something which is common amongst many rural areas in Ireland.

Table 6-6 provides the percentage changes of the different age categories between 2011 and 2016 for the State, Laois, Offaly and the Study Area.

Table 6-6: Difference in Population Percentage from 2011 to 2016

Area	Age Category – Population change 2011 to 2016 as expressed in a percentage				
	0-14	15-24	25-44	45-64	65+
State	0%	0%	-2%	1%	1%
Laois	0%	-1%	-2%	2%	1%
Offaly	0%	0%	-3%	1%	2%
Study Area	1%	-2%	-1%	-2%	4%

As demonstrated in Table 6.6 above, whilst it is unclear to what extent the volatility of migration patterns has impacted population trends, overall, it would appear that the State, Laois, Offaly, have a moderately ageing population as per Census 2011 and 2016 figures with the study area aging at a slightly higher rate.

Commuter Patterns

The commuter patterns of the populations of Laois, Offaly and the Study Area have been analysed to determine journey duration, daytime population figures and place of work in the assessment of the proposed development as set out in Table 6-7 below. Details relating to commuting patterns and location of employment have been retrieved from the CSO 2016 Census results and Profile 6: Commuting in Ireland (Census of Population, 2016).

Table 6-7: Population aged 5 years and over by journey time to work, school or college

Journey duration	Laois 2016	Offaly 2016	Study area 2016
Under 15 mins	36%	40%	32.5%
1/4 hour - under 1/2 hour	26%	25%	28%
1/2 hour - under 3/4 hour	13%	13%	12%
3/4 hour - under 1 hour	5%	4%	6.5%
1 hour - under 1 1/2 hours	8%	6%	1%
1 1/2 hours and over	5%	4%	11%
Not stated	8%	8%	9%
Total Persons (no.)	51,926	46,633	92

As demonstrated in Table 6-7 above, between 1% and 11% of journey times to work, school or college in Laois, Offaly and the Study Area are over 1 hour in duration. Journey times of 1 hour and more are likely to represent people travelling to outside of the county, to areas such as the greater Dublin Area that have large inward working populations. Therefore, the daytime population of Laois and the Study Area will be influenced by the number of persons commuting to areas outside of the County jurisdiction.

Further to this, according to Profile 6: Commuting in Ireland as per the 2016 Census, 3,279 persons who were usually resident in Laois, commuted to Dublin City and suburbs for work. 1,938 persons who were usually resident in Offaly commuted to Dublin City and suburbs for work.

These figures represent 3.87% of the total population of Laois and 2.49% of the total population of Offaly that work in Dublin City and suburbs.

Given the influence of outward commuter flows from the Study Area, Laois and Offaly, it is considered that the potential influence of the proposed development on population will be minimal due to people at work or in college.

6.3.2 Potential Impacts – Construction

The potential impacts on the community arising from the proposed wind farm development during its construction phase include nuisance (such as noise and vibrations), traffic, and visual impact of the construction works.

Throughout the construction phase of the proposed development, construction workers will travel to and from the site. There is no indication that the construction workers will live within the study area.

6.3.3 Potential Impacts – Operation

Once constructed, there will be direct and indirect employment associated with the operational phase of the wind farm. There will be opportunities for mechanical-electrical contractors and craftspeople to become involved with the operation and maintenance of the wind farm, but this is not likely to impact upon the population density in the area. There will be no permanent impact on population in terms of population trends, density, household size, or age structure as a result of the operation phase.

6.3.4 Potential Impacts – Decommissioning

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

Decommissioning works will include removal of all above ground structures including the turbines, mountings, substations, and fencing. The relatively small footprint of the turbines and ancillary structures means that following removal, the site can be substantially returned to its existing condition quite quickly and leave little trace that a wind farm previously existed.

As the decommissioning works will represent an opportunity for employment of construction workers within the vicinity of the wind farm, there will be a slight, positive temporary impact to population in the study area associated with the decommissioning phase.

6.3.5 Mitigation Measures

As there will be no adverse or significant impact on population trends, density, household size, or age structure, no mitigation measures are required.

6.3.6 Residual Impacts

There will be no permanent impact on population in terms of population trends, density, household size, or age structure as a result of the construction phase. Throughout the construction phase of the proposed development, construction workers will travel to and from the site. There is however, no indication that the construction workers will live within the study area. Long term the wind farm will not impact upon the population density and demographic of the study area.

6.4 Socio-Economics, Employment and Economic Activity

This section provides a comprehensive overview of the socio-economic, employment and economic activity associated with the receiving environment in the Study Area, Counties Laois and Offaly and the State, in order to provide an understanding of the overall socio-economic profile of the receiving environment and the potential effects arising from the proposed development.

6.4.1 Existing Environment

State and Laois' Economic Status

Live Register data provides information relating to the number of people registering for Jobseekers Benefit, Jobseekers Allowance, or for various other statutory entitlements. The figure is useful to gauge unemployment estimations for an area, however, it is noted that the Live Register data accounts for part-time workers (working up to three days per week), seasonal workers and casual workers who are entitled to Jobseekers Benefit or Jobseekers Allowance and therefore, cannot be relied upon entirely for conclusive employment data.

Between month 1 and month 7 of 2019, an average of 182,208 persons were recorded on the Live Register for the State. In Laois during the same period an average of 4,005 persons were recorded on the Live Register while 3,945 persons were on the Live Register in Offaly. The State average for persons on the Live Register equates to 4% of the population compared to that of Laois and Offaly which are both averaged at 5% 5%.

The working population is defined as those aged 15 to 64. The basic indicator for employment is the proportion of the working age population aged 15-64 who are employed, Table 6-8 below sets out the percentage of the total population aged 15+ who were in the labour force during the 2016 Census. Table 6-8 also sets out those who were not in the labour force, this includes students, retired people, those unable to work, persons performing home duties etc.

Table 6-8: Economic Status of the Total Population Aged 15+ in 2016

	Status	State	Laois	Offaly	Study Area
% of Population aged 15+ which are:	At work	53.4%	52.5%	50.3%	44.6%
	First time job seeker	0.8%	1.0%	0.9%	0.7%
	Unemployed	7.1%	8.5%	8.6%	8.8%
	Student	11.4%	10.2%	10.7%	6.8%
	Home duties	8.1%	9.4%	9.8%	8.1%
	Retired	14.5%	12.6%	14.3%	24.3%
	Unable to work	4.2%	4.6%	5.0%	6.1%
	Other	0.4%	1.1%	0.3%	0.7%

Overall the principal economic status of those living in Laois (52.5%), Offaly (50.3%) and within the Study Area (44.6%) is at work, with their percentages somewhat lower than the National average at 53.4%. The number of those retired within the study area is higher than the National average (14.5%) at 24.3%.

The employment make-up of an area is an important element of its socio-economic profile. The CSO Census of Population 2016 shows that employment within the Study Area is weighted towards professional services (22.7%), commerce and trade (16.7%), agriculture (13.6%) and manufacturing (12.1%). As indicated in Table 6-9 below, within Laois, professional services represent the largest type of employment (23%), followed by commerce and trade (21.8%) and other (17.5%). Within Offaly, professional services also represent the largest proportion of employment (22.5%), followed by commerce and trade (19.7%) and manufacturing industries (16.9%).

Table 6-9: Industry distribution for the State, Laois and the Study Area, 2016

Persons at work by industry	State	Laois	Offaly	Study Area
Agriculture forestry and fishing	4.4%	7.2%	7.3%	13.6%
Building and construction	5.1%	5.9%	6.1%	6.1%
Manufacturing industries	11.4%	10.2%	16.9%	12.1%
Commerce and trade	23.9%	21.8%	19.7%	16.7%
Transport and communications	8.5%	6.8%	4.9%	6.1%
Public administration	5.3%	7.6%	6.1%	6.1%
Professional services	23.5%	23.0%	22.5%	22.7%
Other	17.8%	17.5%	16.4%	16.7%

6.4.2 Potential Impacts – Construction -Socio Economics, Employment & Economic Activity

In terms of local impact, up to 160 staff could be employed on site at certain stages of construction. The employment of tradespeople, labourers, and specialised contractors for the construction phase will have a direct and indirect short-term, positive impact on the local economy, bringing significant benefits to local service providers and businesses with direct and indirect financial benefits to the local community.

Materials and construction workers will be sourced locally where possible, and this will assist in sustaining employment in the local construction trade. As a result, this will have a short term, positive effect on the employment profile of the area.

Local Business Support Strategy

A Local Business Support Strategy has been developed with the view to maximising the economic benefit for the local area during the construction, operational and decommissioning phases. Businesses in the Graigue area are being encouraged to provide details on the services or goods that they feel that they could deliver which are relevant to the construction and operation of the wind farm.

The *Local Business Support Strategy* includes the following:

- The development and maintenance of an up to date *Local Business Database.*
- The communication of all potential contract/supply opportunities to businesses in the local area.
- The provision of contact details for the Developer's Community Liaison Officer (CLO) who will facilitate and assist local business in their endeavours to apply for contracts or supply agreements.
- The inclusion of the *Local Business Database* in invitations to tender being sent to potential main contractors interested in securing contracts during the construction and operation of the wind farm.
- Tenderers will be required to provide a statement of *Local Economic Gain* in their tender documents.
- Material consideration will be given to the tender submissions that demonstrate higher levels of local business involvement and who can demonstrate increased *Local Economic Gain.*

- During construction, operation and decommissioning, contractors will be required to report on performance in terms of both the number of local businesses supplying services or goods to the project and the local economic benefit accruing therefrom.

6.4.3 Potential Impacts – Operation - Socio Economics, Employment & Economic Activity

6.4.3.1 Economic Value & Employment Potential

The proposed wind farm will contribute to achieving Ireland's energy target that sets out to source 40% of electricity from renewable energy by 2020. The Sustainable Energy Authority of Ireland (SEAI) Report for 1990-2016 indicated that renewable electricity generation accounted for 27.2% (normalised) of gross electricity consumption in 2016. The use of renewables in electricity generation in 2016 reduced CO_2 emissions by 3.9 Mt and avoided €342 million in fossil fuel imports.[3] No single wind farm can be said to make a significant contribution to this achievement, but the cumulative effect can be expected to be high.

According to the European Wind Energy Associated (2009), 0.4 jobs are created per MW of total installed capacity in operations and maintenance of the wind farm, as well as jobs created by other activities related to installed turbines. A study carried out by the Institute for Sustainable Futures (2015) estimates that the operational and maintenance job output is an estimated 0.3 jobs per MW based on an average of 6-7 studies. Based on this estimate, the proposed wind farm development (for the purposes of this calculation it is assumed an installed capacity of 40MW) could be expected to create between 12 and 16 long term operational jobs. This would give rise to a slight, positive impact. It should be noted however, that with future increases in labour productivity the figure of between 0.3 and 0.4 jobs per megawatt of total installed capacity is anticipated to fall to 0.29 jobs by 2030.

Over the lifetime of the project up to 140 jobs will be created during construction, operation and maintenance of the wind farm. This is based off the calculation provided by the Institute for Sustainable Futures (2015) of 3.2 jobs per MW during construction and 0.3 jobs per MW during operation and maintenance.

People working on the construction or operation of the wind farm who live outside the area are anticipated to spend some of their income in local shops and accommodation during their time in the area. Based on the above calculations this could be up to 128 no. additional indirect jobs. According to the Irish Wind Energy Association (IWEA), there were over 3,400 jobs directly related to wind energy in Ireland at the end of 2013, with more people joining the sector in 2014. The Jobs and Investment in Irish Wind Energy – Powering Ireland's Economy report prepared by Deloitte on behalf of IWEA in 2009 states that the Irish Wind Energy Sector up to 2020 is capable of supporting more than 10,760 jobs through direct and indirect involvement in the sector. These jobs comprise a mix of development, construction and operation jobs reflecting the current stage of development of the industry. The 2014 Value of Wind Energy to Ireland prepared for IWEA by Pőyry and Cambridge Economics states that meeting the 2020 renewable targets, will require the sustained installation of c. 270MW of new wind capacity annually. The associated annual investment of over €430 million (1.2% of total Irish Investment) will support 12,390 jobs during wind farm development and will support 920 jobs in the operations and management sector to support windfarms by 2020.

6.4.3.2 Proposed Community Benefit Scheme

An important part of wind farm development is the Community Benefit Scheme. The main benefits of the scheme include: Direct returns, Support for local community groups and support for local educational funds. The concept of directing benefits from wind farms to the local community is promoted by the National Economic and Social Council (NESC) and the Irish Wind Energy Association (IWEA) among others.

While it may be simpler and easier to put a total fund aside for a wider community area, the Dernacart Wind Farm is endeavouring to establish new ways to direct the proposed shared value of the Scheme towards the local community with particular focus on those living closest to the wind farm. Given that local people understand the needs and requirements of the local community best, consultation with those in the local community on the form that the community benefit package should take has formed an integral part of developing this proposal.

[3] SEAI (2017). 'Energy in Ireland 1990-2016: 2017 Report'. Available at: https://www.seai.ie/resources/publications/Energy-in-Ireland-1990-2016-Full-report.pdf

A significant community benefit fund will be made available for the local area and should the project be developed under the RESS scheme, based on the proposed layout approximately €250,000 per year would be available for the local area for the lifetime of the scheme. To put this in perspective, €1.25 million would become available within the first 5 years of operation and €2.5 million within 10 years. The value of this fund will be directly proportional to the energy output of the wind farm, on the project being successful in securing RESS support and the duration of that support. Further detail on the RESS scheme is outlined in Chapter 4 of this EIAR.

As also detailed in Chapter 4 public consultation and engagement with the local community began at a very early stage in the development process. At this time, a nominated Community Liaison Officer (CLO) was appointed to the area and since then the CLO has been the main point of contact for the local community with a dedicated phone number being assigned to the CLO and this project specifically.

Since the early stages and through engagement with the local community and local businesses, feedback was actively sought on ideas regarding the form that the Community Benefit Scheme should take and how best to achieve maximum potential benefit from the available funding. Further detail on the consultation background to the proposed Community Benefit Scheme is given in Chapter 1 and Chapter 5.

The development of renewable energy to replace conventional fossil fuels is considered essential and represents a positive move for Ireland given the role that it plays in effective climate action. The Developer also believes that it is important to provide the positive benefits of renewable energy to local communities.

Direct return - In many areas it is felt that those living closest to the wind farm should receive a direct return from it. This is based on the principle that locally generated electricity should directly benefit those living in the local area. This is a concept that is supported by the Developer and one that they have worked with other communities on.

Support for local community groups - The community benefit fund can be used to develop local groups that service the needs of the local area. These would include local youth groups, services for the elderly, sporting organisations, schools etc.

Local educational fund - For some, the cost of access to further education, be that for themselves or their children, can be prohibitive. Part of the community benefit fund can be used towards assisting local people with these costs.

6.4.3.3 Property Prices and Value

There is currently no evidence to indicate that wind farms have a negative impact on the property market. There are no known studies undertaken to consider this impact in Ireland, however, a number of international studies have been reviewed in order to assess the potential impact of the proposed development on property prices in the area.

A 2007 report from the Royal Institute of Chartered Surveyors (RICS) and Oxford Brookes University in the UK found no clear relationship between the proximity of wind farms and property prices. Indeed, the report highlighted the views of local estate agents that proximity to a wind farm was, "simply not an issue".

In 2006, research from the Edinburgh Solicitors' Property Centre (ESPC), focusing on property sales near Crystal Rig Wind Farm in the Scottish Borders, found no evidence of a negative impact on the price of property in nearby areas. The ESPC study found that prices in the town of Dunbar had risen from below the regional average over the previous four years, during which time the wind farm was built, and that since the wind farm began operating, property price inflation in Dunbar has continued to exceed that achieved across East Lothian. Based on this information it is assumed that there will not be a significant impact on property prices in the vicinity of the proposed development.

A 2014 UK study entitled 'The effect of wind farms on house prices' carried out by the Centre for Economics and Business Research (CEBR) and commissioned by Renewable UK (previously BWEA) concluded that 'there is no evidence to suggest that there was a long-term negative impact on house prices, either during the period of construction or post completion of the wind farms.'

The purpose of this 2014 UK study was to examine whether windfarms have an effect on the value of residential properties within a 5km radius of the site.

This was accomplished in two parts:

Part 1: by analysing house price growth based on transactions completed within a 5km radius for seven wind farm sites to those in the wider county area between 1995-mid 2013

Part 2: the study used econometric tests to see if wind farms caused an impact on price growth.

The analysis of the raw house price data for transactions completed within the vicinity of the wind farms (radius of 5km) yielded no evidence that prices have been affected by either the announcement, construction or completion of the wind farms for six of seven sites.

For all three econometric tests conducted, there was no negative impact found within 5km of the wind farm installation.

Test 1: Over the period between announcement of plans to construct wind farm and present day – there was no statistically significant difference and no negative impact on house price growth within 5km of a wind farm

Test 2: Over the period between start of construction and present day – statistically significant positive impact on house price growth found within 5km of a wind farm.

Test 3: Over the period between wind farm completion and present day – statistically significant positive impact on house price growth found within 5km of the wind farm.

The study concluded that although the number of case studies is limited, the descriptive and econometric analyses show that across the sites analysed, there is no evidence to suggest that there was a long-term negative impact on house prices, either during the period of construction or post completion of the wind farms.

A US government study 'The Impact of Wind Power Projects on Residential Property Values in the United States' carried out in 2009 by Lawrence Berkley National Laboratory (LBNL), recorded the sale price of approximately 7,500 homes in nine states and then devised mathematical models to reveal how, all other things being equal, proximity to a wind farm affected their value. It found that homes less than 1.5 kilometres from a wind farm sold for no less, on average, than homes 8 kilometres away. Similarly, home values tended to remain stable long after wind farms were erected. The most recent comprehensive piece of research on wind turbines, commissioned by the US Government and published in 2013 states that 'Across all model specifications, we find no statistical evidence that home prices near wind turbines were affected in either the post-construction or post announcement/pre-construction periods. This survey was carried out collecting data from 50,000 homes in nine different states.

The LBNL study has been updated as per the peer-reviewed paper 'A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States' in August 2013. Data was collected for more than 50,000 home sales amongst 9 US states which were located within 10 miles of 67 different wind facilities, with 1,198 sales within 1 mile of a turbine. The study found no statistical evidence that home prices near wind turbines were affected in either the post-construction or post-announcement/pre-construction periods.

Renewable UK (previously BWEA) conducted a study on the effects of wind farms on house prices in March 2014. The analysis considered the raw house price data for transactions completed within the vicinity of wind farms. The results found that no evidence that prices had been affected by either the announcement, construction or completion of the wind farms for six out of seven of the sites. The study recognises the limited number of case studies analyses; however, the findings demonstrate that there is no evidence to suggest a long-term negative impact on house prices during construction of post completion of wind farms.

Climate Change Scotland's study, 'Impact of wind Turbines on House Prices in Scotland', published in October 2016 presents the key findings of a study carried out on over 500,000 properties sales in Scotland between 1990 and 2014.

The key findings of the research are summarised as follows:

1. *"No evidence of a consistent negative effect on house prices: Across a very wide range of analyses, including results that replicate and improve on the approach used by Gibbons (2014), we do not find a consistent negative effect of wind turbines or wind farms when averaging across the entire sample of Scottish wind turbines and their surrounding houses. Most results either show no significant effect on the change in price of properties within 2km or 3km, or find the effect to be positive.*

2. *Results vary across areas: The results vary across different regions of Scotland. Our data do not provide sufficient information to enable us to rigorously measure and test the underlying causes of these differences, which may be interconnected and complex."*

Based on international literature and peer-reviewed articles, there may be impacts on individual properties due to local factors, however, it can be reasonably assumed that no significant impact on property values in the vicinity of the wind farm will arise as a result of the proposed wind farm development.

6.4.4 Potential Impacts – Decommissioning

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

Decommissioning works will include removal of all above ground structures including the turbines, mountings, substations, and fencing. The relatively small footprint of the turbines and ancillary structures means that following removal, the site can be substantially returned to its existing condition quite quickly and leave little trace that a wind farm previously existed.

There will be a slight, positive temporary impact to socio-economics, employment and economic activity in the study area associated with the employment of construction workers within the vicinity of the wind farm during the decommissioning phase.

6.4.5 Mitigation Measures

The proposed development will provide employment opportunities for members of the local community during the construction phase and will provide ongoing employment opportunities in respect of maintenance and operation crew, and to the developer involved.

Local rates and development contributions to be paid by the developer will contribute significant funds to Laois County Council. This funding will be used to improve the services available to the people of the County. The Laois County Council Development Contribution Scheme (2017-2023) indicates a charge of €10,000 per MW of capacity will apply to wind turbine installations generating over 0.5 MW of energy. In addition, the Development Contribution Scheme charges €50,000 per turbine over 100m tall. Based on the current proposal of 8 no. turbines (185m) and an installed capacity of over 40MW, a total Development Contribution of over €800,000 would be payable by the Developer following construction. Services that will benefit from rates and development contributions include road upkeep, fire services, environmental protection, street lighting, footpath works etc., along with other local community initiatives and supports.

The proposed community benefit package will provide benefits and funding for local community projects and accordingly, may enhance the local community interaction.

Given that the effects are predominantly positive in respect of socio-economics, employment and economic activity, no further mitigation measures are necessary.

6.4.6 Residual Impacts

The residual socio-economic impact of the development is considered to be positive, as a result of the employment opportunities associated with the construction, operation and decommissioning of the wind farm. There will also be positive impact associated with income from goods and services procured locally by construction and operations workers.

The rates generated from the proposed development will result in positive residual impacts for both the local area and wider county of Laois resulting from the investment in services, infrastructure and facilities.

The community benefit scheme proposed will support local projects including environmental improvements and recreational, social or community amenities and initiatives which will also give rise to positive residual impacts.

6.5 Land Use

This section assesses the compatibility of the proposed development with the current land use at and around the proposed wind farm development site. Potential effects on land use have been assessed for the construction operational and decommissioning phases of the proposed development.

6.5.1 Existing Environment

The site of the proposed development is located in relatively low-lying but undulating land with the majority of proposed turbines located beneath the 80m contour line. The landcover is classified in Corine as 2.3.1 Pastures; 3.1.2 Coniferous Forest and 3.2.4 Transitional Woodland shrub. The Corine land cover for the wind farm site is illustrated in Figure 6-5. The site is adjacent to a cutover bog

The landscape is classified as Western Boglands and North Western Lowlands according to Table 14.3 of the Laois County Development Plan 2017 – 2023.

The Census of Agriculture (2010) has been reviewed to determine the types of agriculture land use in the area of the proposed development. The total area of the study area for the assessment of population and human health (in terms of the electoral division) is 1,300 hectares. There are 46 persons identified for the labour input for agriculture within the study area and 6,670 persons in Laois as of 2010. There are 23 farms within the study area, and 3,312 farms within the county of Laois, according to the 2010 Census of Agriculture in Ireland.

The Census of Agriculture (2010) provides the number of farms within the study area and within Laois, as well as the types of farming being undertaken.

The number of farms in the study area increased from 20 in 1991 to 23 in 2010 whilst the total number of farms in Laois reduced by 83 during the same period.

The most prevalent form of farming within the study area in terms of hectares farmed, and within Co. Laois is Pastures. In terms of livestock, 2,146 cattle are indicated according to the Census of Agriculture of 2010 for the study area, an increase of 365 from 1991 figures. In Laois, there were 223,965 cattle in 2010 identified in the Census of Agriculture for 2010, -this was an increase of 8,841 for the county.

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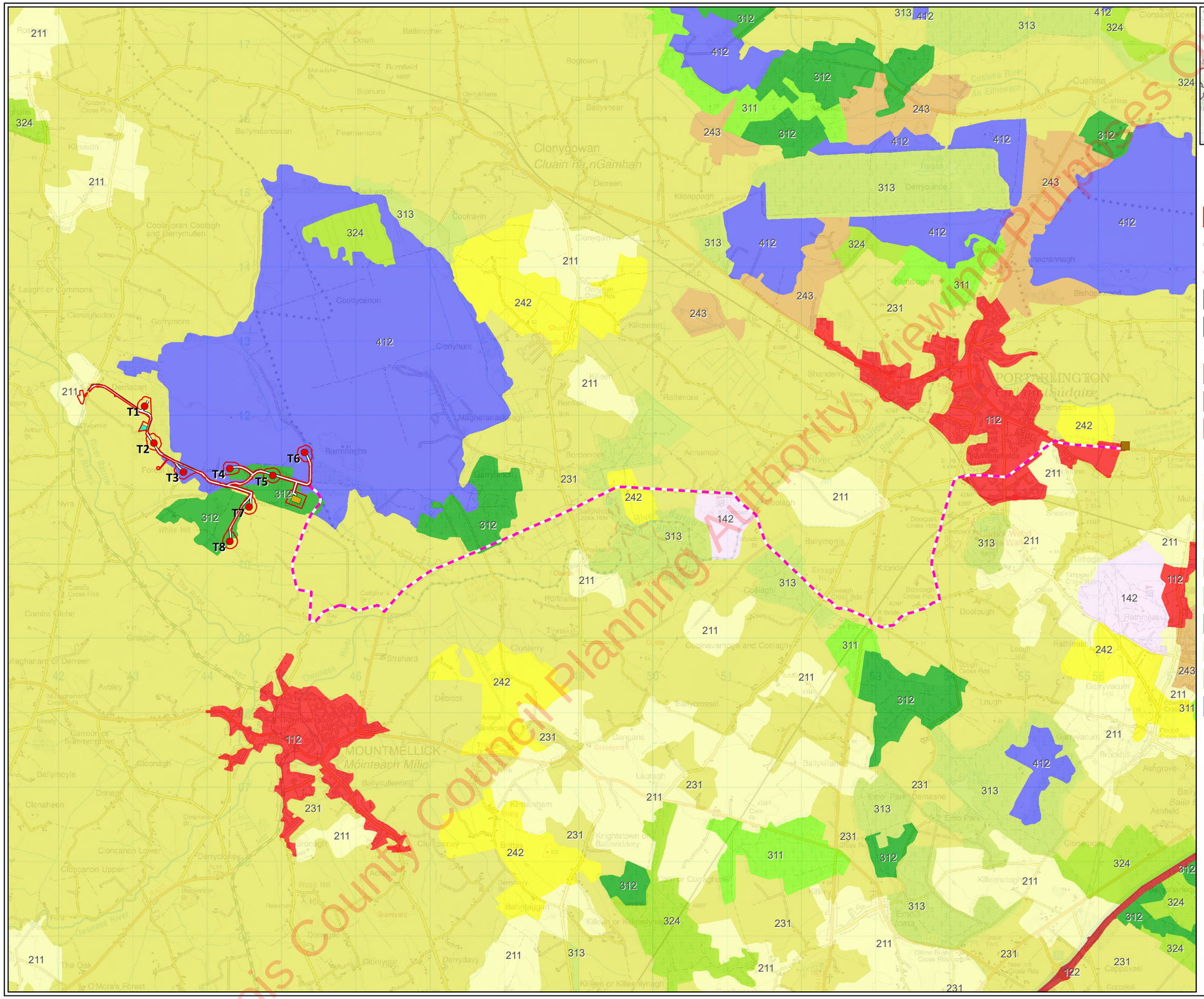

TITLE:	CORINE Land Cover
PROJECT:	Dernacart Wind Farm
FIGURE NO:	6.5
CLIENT:	Statkraft
SCALE:	1:50000
REVISION:	0
DATE:	30/01/2020
PAGE SIZE:	A3

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6.5.1.1 The Bloodstock Industry

There is no reference to wind turbine effects on bloodstock activity in the Wind Farm Planning Guidelines and there is no published evidence or scientific research known to the applicant that suggests operational wind turbines have any ongoing effect on the bloodstock industry.

Similarly, whilst there is no published scientific research specifically relating to the impact of turbines on horses there has been research into the effect of noise on horses. In 2014 Marshall Day Acoustics published a Summary of Research of Noise Effects on Animals[4]. Marshall Day assesses specifically the impacts that varying levels of noise have on horses. Marshall Day Acoustics examine horses in three differing potential behavioural settings: horses in stables, breeding mares and racing horses, as outlined hereunder.

Horses in Stables

As per the Marshall Day Acoustics assessment, it was found that horses in the stables at the Flemington Racecourse Australia [area of study], the home of the Melbourne Cup, showed little response when exposed to significant noise levels coming from Australia's largest touring music concert being held on site in 2008. Huybregts (2008) report commissioned by the Victoria Racing Club on the concert is described as follows:

> *"A case study by Huybregts from Marshall Day Acoustics observes that horses in stables exposed to LAeq,15min of 54-70 dB generally show little response to music noise unless the noise is particularly impulsive……Huybregts (2008)"*

Breeding Mares

Horses have been observed on how they react to the low overflights of jet aircraft. LeBlanc et al. (1991) studied the effects of simulated aircraft noise over 100 dBA and visual stimuli on pregnant mares shortly before parturition. They specifically focused on any changes in pregnancy success, behaviour, cardiac function, hormonal production, and rate of habituation.

Marshall Day (2014) summarises the conclusions in this regard of Le Blanc et al's research as follows:

> *"Le Blanc et al (1991) found that birth success of pregnant mares was not affected by F-14 jet aircraft noise. While the 'fright-flight' reaction was initially observed, the mares did adapt to the noise."*

Race Horses

Race Horses Marshall Day Acoustics assessed the impact on race horses as follows;

> *"Race horses are known for being high-strung. However, Marshall Day Acoustics have observed horses grazing in paddocks directly under the main approach path of the Christchurch International Airport where noise levels are in excess of 90 dB (LAmax) during an aircraft flyover. Although these horses are arguably "used to" the noise, there was generally little recognition by them of an aircraft passing, let alone any sign of disturbance. This tends to support the conclusions by Le Blanc et al (1991)".*

In Hubregts (2008) it is also observed that during the Easter Festival (2006) and Melbourne Cup (2007) race days themselves the race horses were exposed to and competed in average noise levels of between 70 dBA LAeq and 90 dBA LAeq.

Receiving Environment relating to Equestrian Facilities and Centres

There are a number of equestrian centres and stud farms in the surrounding area. 16 no. stud farms are identified within the directory of stud farms for Co. Laois & Co. Offaly[5].

[4] Marshall Day Acoustics (2014). 'Summary of research of noise effects on animals.

[5] Source: http://www.directoryoftheturf.com/

Equine facilities in the immediate vicinity of the proposed wind farm development were considered. Facilities (listed in Table 6-10) located within a 15 km distance of wind turbine locations are as follows:

Table 6-10: Equestrian facilities within approximately 15 km of the nearest turbine

Facility	Distance to nearest turbine
Anngrove Stud	3.8 km
Ballycrystal House Stud	9.75 km
Gurteen Stud	11.75 km
Treascon Stud	14.5 km

In the absence of any national policy of guidance on the treatment and consideration of wind energy developments and the equine industry, the British Horse Society's Advice on Wind Turbines and Horses – Guidance for Planners and Developers has been reviewed.

The BHS Policy Statement recommends separation distance be taken into consideration in respect of wind farm developments and equine facilities in relation to paths and bridleways:

> *"minimum separation distance of 200m or three times blade tip height (whichever is greater) will be required between a turbine and any route used by horses or a business with horses."*

The maximum tip height anticipated for the proposed wind farm development is up to 185m, and therefore, a separation distance of 555m is well achieved in the siting of wind turbines between equestrian facilities routes.

6.5.1.2 Case Studies of Wind Turbines and Horses

The scientific research supports the conclusion that horses exhibit adaptation, acclimatisation, and habituation after repeated exposure to noise and visual stimuli. Marshall Day (2014) supports the view that noise has minimal effects on animals;

> *"Once animals become habituated to noise, especially when it is steady and associated with clearly non-threatening activity, they suffer very little adverse response."*

In terms of providing evidence of how horses exhibit an adaptation and habituation to operational wind farms there are already examples of existing wind farms being located on or near stud farms, equestrian centres and horse-riding trails in the UK and Ireland.

The operational Mace Upper wind energy scheme in Co. Mayo (planning reference 00/1954 and 06/2476) is on an estate that operates an equestrian centre. An appeal to An Bord Pleanála (PL16.221313) was made in which the issue of the interaction of horses and wind turbines was raised. Section 10.8 of An Bord Pleanála's Inspectors Report dismissed this point as it did not represent a significant issue.

In Britain, the first onshore wind farm which became operational in 1991 was developed on the site of a stud farm. This wind farm, which has since been expanded, is in Delabole in Cornwall. Young horses are regularly broken in within 50 metres of wind turbines and are ridden through the wind farm site. Along with having no discernible impact on the horses, there are no reports of any animal or activities disturbances at the adjacent Camel Valley Riding Club from the turbines. Furthermore, in 2007, a nine turbine wind farm was developed at Stags Holt in the Fenlands in Cambridgeshire on a site adjoining a stud farm. This wind farm was subsequently extended to almost double its original size in 2010 and there have been no issues with the owners of the stud.

In conclusion, considering the existing scientific evidence, the proposed wind farm layout, the case studies and the mitigation measures outlined, the Dernacart wind farm as proposed will not have a significant impact on the bloodstock industry in the area.

6.5.2 Potential Impacts – Construction – Land Use

The existing land use of the area surrounding the wind turbines and associated infrastructure where no works are proposed will remain as existing. Land use will be changed during the construction phase of the proposed development where the development will occupy a small proportion of the development site area.

Temporary effects will arise as a result of the construction and installation of cable route which will be within the road corridor. The road will be reinstated following construction with no permanent change of use.

6.5.3 Potential Impacts – Operation – Land Use

Given that the proposed development's footprint will occupy a small proportion of the development site area, it is anticipated that there will be minimal changes to land use from the proposed development.

The land use within the boundary of the development will change in areas where access tracks, wind turbine bases, hardstanding areas, and substation associated drainage works are required.

The main land uses of agriculture and forestry of the proposed development site will continue to co-exist with the proposed wind farm. Therefore, there will be no impact on land use.

6.5.4 Potential Impacts – Decommissioning – Land Use

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

Decommissioning works will include removal of all above ground structures including the turbines, mountings, substations, and fencing. The relatively small footprint of the turbines and ancillary structures means that following removal, the site can be substantially returned to its existing condition quite quickly and leave little trace that a wind farm previously existed.

There will be a slight localised change to land use associated with the removal of turbine infrastructure and reinstatement of previous land use during the decommissioning phase. Once decommissioning has ceased, no effects will remain.

6.5.5 Mitigation Measures

The land use within the site boundary of the proposed development will change where proposed works will take place. Mitigation measures for land use are primarily related to preliminary design stage, which has allowed for the prevention of unnecessary or inappropriate ground works or land use alterations to occur. The construction footprint will be kept to the minimum necessary.

No further mitigation measures are required.

6.5.6 Residual Impacts – Land Use

Once mitigation measures and appropriate design measures are incorporated, as proposed, into the proposed wind farm development, there will be minimal change to land use with no significant adverse negative residual effects arising from the project on land use.

The residual land use impacts are neither negative or positive given the area that will contain infrastructure within a small percentage of the total site, and existing land uses can continue during the operation of the wind farm. The laying of HV cables in the road corridor will have temporary effects, the road will be reinstated following completion of works, minimising the residual impact of the cables on land use.

6.6 Recreation, Tourism and Amenity

This section provides an overview of the recreation, tourism and amenity value of the study area, Counties Laois and Offaly and the State in order to assess the potential effects arising from the proposed development.

6.6.1 Existing Environment - Recreation, Tourism and Amenity

Tourism is one of the major contributors to the national economy and is a significant source of full time and seasonal employment. In 2017 overseas tourist visits to Ireland grew by 3.2% to 9.0 million. Expenditure by tourists visiting Ireland was estimated to be worth €5.3 billion in 2017, which represents a 4.2% growth on 2016 figures. [6]

Tourism is considered an important industry for County Laois. Chapter 5: Economic Development of the Laois County Development Plan, 2017-2023, identifies that

> *"County Laois is home to a number of nationally renowned visitor attractions including; the Rock of Dunamase, The Round Tower Timahoe Aghaboe Abbey; the Slieve Bloom Mountains, the Rivers Nore and Barrow as Important Tourism Attractions" (Section 5.11)*

Fáilte Ireland, the National Tourism Development Authority, has published Tourism Facts relevant to 2017 as well as Guidelines on the treatment of tourism in an Environmental Impact Statement. These have been taken into consideration in the preparation of this EIAR chapter as highlighted in Fáilte Ireland's consultation response.

As recommended in Fáilte Ireland's Guidelines, in respect of the assessment of potential effects arising from a proposed development on tourism, the following have been considered:

- Indicate the numbers of premises and visitors likely to be directly affected directly and indirectly.
- Identify and quantify, where possible, their potential receptors of impacts, noting in particular transient populations, such as drivers, walkers, seasonal and other non-resident groups.
- Describe any significant trends evident in the overall growth or decline of these numbers, or of any changes in the proportion of one type of activity relative to any other.
- Indicate any commercial tourism activity which likely to be directly affected, with resultant environmental impacts.

Regional Tourism performance figures for 2017 have been made available by Fáilte Ireland (July 2018). As demonstrated in Table 6.11 below, overseas tourist numbers for the Midland region totalled 218,000 overseas visitors in 2017. Tourist revenue accounted for €85 million for overseas tourists. Northern Ireland tourist figures totalled 15,000 tourists in 2016 with €13 million in revenue generated from Northern Ireland visitors. Figures for 2018 have not yet been released.

Table 6-11: Mid East Regional Performance (Tourists in 2017)

Region		Britain	Mainland Europe	North America	Other Areas	All Overseas	Northern Ireland	Domestic Trips
Midlands[7]	Tourists (000s)	91	75	40	11	218	15	422
	Tourist Revenue (€mn)	33	34	13	6	85	4	71

[6] Fáilte Ireland, Tourism Facts 2017,Published July 2018, Available at: http://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/5_International_Tourism_Trends/Tourism-Facts-2017_1.pdf?ext=.pdf

In addition to the regional performance above, Fáilte Ireland also published visitor numbers of Co. Laois. In 2017 Overseas visitors totalled 43,000 for Co. Laois and accounted for €14 million in revenue. Domestic visitors totalled 280,000 for Laois and Offaly together and accounted for €30 million in revenue. Individual domestic visitor figures were not available for Co. Laois and Co. Offaly as the two counties had been assessed together.

The Slieve Bloom Mountains are located approximately 8 km to the south west of the Dernacart Wind Farm site and are split between Laois and Offaly. The mountains are popular with visitors including: hikers, recreational walks and eco trails. The Clamphole waterfall and Glenbarrow trailhead are of the most popular visitor locations in the Slieve Bloom Mountains. The Calmphole waterfall is located c. 8.2km to the south west of the Dernacart Wind Farm site.

The Rock of Dunamase is located 15.2 km to the south east of the Dernacart Wind Farm site and is one of the main tourist attractions in County Laois. The ruins of the Rock which represents one of the eight National Monuments in Co. Laois are managed by the State and form part of the Laois Heritage Trail and Irelands Ancient East.

The Round Tower Timahoe is located c. 22.4 km south east of the Dernacart Wind Farm site and is an example of a 12th century round tower. The St. Mochua Monastery ruins lie within the grounds of the round tower and the ruins and Tower represent one of the eight National Monuments within County Laois. As with the Rock of Dunamase the Tower forms part of the Laois Heritage Trail and Irelands Ancient East.

Aghaboe Abbey is located c. 27.5 km south west of the Dernacart Wind Farm site. The Abbey was founded by St Canice in the 6th century and rebuilt as an Augustinian prior in the 13th century[8] The Abbey also forms part of the Laois Heritage Trail and Irelands Ancient East Tourism Area..

The Grand Canal Way is a National Waymarked Trail and is managed by Waterways Ireland. It is 117km in length and connects Dublin to the River Shannon. The route of the Grand Canal Way passes c. 15km to the north of the Dernacart Wind Farm site.

Angling is the premier recreational activity on the Grand Canal with multiple hotspots and competitive stretches along its length. Similarly, boating, canoeing, cycling and walking are popular recreational activities throughout the Grand Canal Way (c. 15km from the nearest turbine).

6.6.2 Potential Impacts – Construction - Recreation, Tourism and Amenity

During the construction phase of the proposed wind farm development, there is potential for impacts on recreation, tourism and amenity users in the vicinity of the site from increased construction traffic, and dust and noise nuisance. However, given there are no recognised visitor attractions or amenities within the study area there will be no negative effect on recreation, tourism and amenities.

Potential construction impacts along the cable route may occur as the cable is c. 16km in length and will be installed in public roadways. Any disruption will be mitigated where possible by maintaining access for people throughout, and where this is not possible, by minimising the impact through the provision of clear and timely information on the timing and scope of planed works to the local community.

Construction activity associated air quality aspects with can potentially have negative impact on the amenity a of the area are discussed in Chapter 5 Air Quality and Climate Change.

Details of potential traffic impacts are provided in Chapter 10: Roads, Traffic and Transportation. Details of potential visual impacts during construction phase are dealt with in Chapter 11: Landscape and Visual, with potential noise and vibration effects discussed in Chapter 8.

[8] https://laois.ie/departments/heritage/laois-heritage-trail/aghaboe-abbey/

6.6.3 Potential Impacts – Operation - Recreation, Tourism and Amenity

According to the Department of the Environment, Heritage and Local Government's document: Wind Energy Development Guidelines for Planning Authorities, 2006, tourism and wind energy developments can co-exist happily:

> *"Wind Energy developments are not incompatible with tourism and leisure interests, but care needs to be taken to ensure the insensitively sited wind energy developments do no impact negatively on tourism potential. The results of survey work indicate that tourism and wind energy can co-exist happily[9]"*

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

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

Where negative attitudes towards wind farms were voiced, the visual impact of the turbines on the landscape was the strongest influence. The report however also noted 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.

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

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

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

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

It is sometimes suggested that wind farm developments could be considered to spoil the scenery. However, it is also remarked that wind projects help foster an image of a clean environment for tourists. Both anecdotal and statistical evidence show that the latter is the more common view. The most conclusive evidence to date comes from a study by Fáilte Ireland on "Visitor Attitudes on the Environment". In 2008, Fáilte Ireland, in association with the Northern Ireland Tourist Board (NITB), surveyed both domestic (25%) and overseas (75%) holidaymakers to Ireland to determine their attitudes to wind farms. The survey results indicate that most visitors are broadly positive towards the idea of building more wind farms on the island of Ireland. A minority (one in seven) were negative towards wind farms in any context.

[9] Survey work refers to Sustainable Energy Ireland's (SEI's) Attitudes towards the Development of Wind Farms in Ireland (2003)

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

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

Further research has been undertaken in Scotland in 2011 by Visit Scotland who have produced a Wind Farm Consumer Research report which showed that 83% of those surveyed said a wind farm would not affect their decision about where to stay when on a holiday or short break in Scotland.

Also, against a backdrop of increased wind farm deployment, Visit Scotland's statistics showed the number of visits to Scotland in 2010 and the amount of spending by visitors both increased while their 'Scotland National Visitor Survey 2011' made no mention of the issue of wind farms affecting tourism in Scotland.

Notwithstanding the above, during the operational phase of the wind farm there will be a slight to imperceptible impact on tourism with views of the wind farm from the Slieve Bloom Mountains. This impact is not deemed significant due to the distance of the mountains and because wind farms are an already existing feature within the Irish landscape.

It is not considered that the operation of the proposed wind farm development will have a significant adverse effect on tourism in the vicinity of the proposed development.

6.6.4 Potential Impacts – Decommissioning - Recreation, Tourism and Amenity

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

Decommissioning works will include removal of all above ground structures including the turbines, mountings, substations, and fencing. The relatively small footprint of the turbines and ancillary structures means that following removal, the site can be substantially returned to its existing condition quite quickly and leave little trace that a wind farm previously existed.

There will be no impact on recreation, tourism and amenity in the study area associated with the wind farm during the decommissioning phase of the wind farm.

6.6.5 Mitigation Measures

Mitigation measures to minimise impacts on recreation, tourism and amenity are primarily related to the design stage, as the development has been sited and designed to prevent unnecessary or inappropriate development to occur that would significantly affect any recreational or tourist amenity.

6.6.6 Residual Impacts

While there may be a temporary - short-term negative impact to recreation, amenity and tourism during the construction phase of the development, there will be no significant, adverse impacts in the surrounding area. During the operational phase of the wind farm there will be a slight to imperceptible impact on tourism with views of the wind farm from the Slieve Bloom Mountains. It is not considered that the operation of the proposed wind farm development will have any significant adverse effect on tourism in the vicinity of the proposed development.

6.7 Human Health

This section provides an overview of the health profile of the population in the Study Area and the State in order to facilitate an assessment of the proposed development on human health. A review of peer reviewed literature has been carried out to provide a sound, scientific basis for the potential effects arising from wind farm development. For this assessment potential health impacts of the underground cable have been scoped in, and as a result the study area for this assessment is made up of the following EDs: Ballybrittas, Emo, Graigue, Hammerlane, Killmullen, Portarlington South.

6.7.1 Existing Environment – Human Health

Human health risk in relation to this assessment refers to the nature of and possibility for adverse health effects on humans.

In the context of existing human health, the Department of Health (2016) has published a report entitled 'Health in Ireland, Key Trends 2016' which provides statistics relating to human health and health care in Ireland over the previous 10 years. Generally speaking, the vast majority of Irish people consider themselves to be of very good or good general health as demonstrated in self-evaluation statistics included in Census data (see Table 6.12 below).

Approximately 88% of the responses recorded for the Study Area in 2016 indicated very good or good health which is above the State response (87%), Laois's response (87%) and Offaly's Response (86%) for 2016. 1% of the study area responded to have 'bad' general health which is in line with the State's response (1%), Laois's response (1%) and less than Offaly's response (2%) for 2016. 0% of the responses in the study area, Laois, Offaly and the State indicated very bad general health.

Table 6-12: Population by general health 2016

General Health	Study Area 2016	Laois 2016	Offaly 2016	State 2016
Very good	62%	59%	57%	59%
Good	26%	28%	29%	28%
Fair	8%	8%	9%	8%
Bad	1%	1%	2%	1%
Very bad	0%	0%	0%	0%
Not stated	3%	4%	3%	3%

As part of the human health impact assessment of the proposed wind farm development, an analysis of peer-reviewed health literature on potential effects arising from wind farm projects was undertaken. This demonstrated that there are generally no merits behind perceptions of negative health effects on people, living in proximity to wind turbines.

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

- 'Wind Turbine Syndrome – An independent review of the state of knowledge about the alleged health condition', *Expert Panel on behalf of Renewable UK*, July 2010.
- 'Wind Turbine Sound and Health Effects - An Expert Panel Review', *American Wind Energy Association and Canadian Wind Energy Association*, December 2009.

- 'A Rapid Review of the Evidence', *Australian Government National Health and Medical Research Council (NHMRC) Wind Turbines & Health*, July 2010.
- 'Position Statement on Health and Wind Turbines', *Climate and Health Alliance,* February 2012.
- 'Wind Turbine Health Impact Study - Report of Independent Expert Panel' – *Massachusetts Departments of Environmental Protection and Public Health*, 2012.
- 'Wind Turbines and Health, A Critical Review of the Scientific Literature Massachusetts Institute of Technology', *Journal of Occupational and Environmental Medicine*, Vol. 56, Number 11, November 2014.

Further details on this is presented in Chapter 6.7.3.2 Health and Safety Standards and Procedures

6.7.2 Potential Impacts – Construction – Human Health

Potential Health and Safety Impacts during Construction

Construction of the proposed development and associated roads will entail the establishment of a construction site, as is the case for wind farm developments of this scale. The construction site and materials utilised on site may pose potential health and safety hazards to construction workers and to the general public, if site safety rules are not properly implemented.

The proposed wind energy development will be designed, constructed, operated and decommissioned in accordance with the following:

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

Aspects of the development that may pose health and safety risks, include the following:

- Use of heavy machinery including earthworks
- unexpected ground conditions, soft ground
- water crossings
- traffic safety during the transport of heavy and/or oversized loads to the site along the turbine delivery route
- lifting of heavy loads overhead using cranes
- working with electricity during commissioning
- working at heights
- general construction site safety (e.g., slip/trip, moving vehicles etc.)
- substation construction
- electrical cables

A Safety and Health Management Plan covering all aspects of the construction process will deal fully with these and other safety related issues. A preliminary/Draft Construction and Environmental Management Plan (CEMP) has been provided in Appendix 4.2. of Volume 3 EIAR Appendices. It will be further developed at construction stage.

Health and safety management on farmed land represent routine for such lands. Within the site boundary, access will be restricted in certain parts of the site during construction. For instance, no public access will be available into construction compounds or the proposed turbine areas. Access to other areas of the site will be discussed and agreed on a one-to-one basis to cater for each individual's requirements.

6.7.3 Potential Impacts – Operation – Human Health

6.7.3.1 Site access and usability of lands

Under normal operating conditions, presence at the site including the area of the turbines is safe for people and animals. There will be no fences or barriers restricting access other than normal livestock fencing, and livestock can continue to graze on the land during operations as normal.

The proposed development is expected to have minimal impact on agricultural practices on the lands due to only a small area of land being occupied by the development. This loss of land is not expected to have an adverse impact on livestock (cows or sheep) and horses in the surrounding area.

There are numerous examples of wind farms where livestock coexist and graze routinely in fields hosting wind turbines. Existing land use, such as grazing livestock or crops can continue on the site as normal, therefore, there will be no adverse effect on farmers or other local residents who normally use the land as a result of the proposed development.

Access to the turbines will be through a door at the base of the structure. This will be locked at all times.

The workings of the turbines due to their design, specifications and standards will not present a danger to the public. The wind farm is designed to last a minimum of 30 years and the turbines are equipped with a number of safety devices to ensure safe operation during their lifetime.

6.7.3.2 Health and Safety Standards and Procedures

The rigorous statutory and engineering safety checks imposed on the turbines during design, construction, commissioning, operation and decommissioning will ensure that any associated risks to humans are negligible. 24-hour remote monitoring and fault notifications are included as standard in the Turbine Operations and Maintenance Contracts. In addition to scheduled maintenance, the maintenance contracts will allow for call out of local engineers to resolve any issues as soon as they are picked up on the remote monitoring system.

While the equipment within the high voltage substation presents a potential safety hazard, the substation will be enclosed by palisade fencing and equipped with intruder and fire alarms in line with ESB and EirGrid standards.

There are anecdotal reports of negative health effects in people who live in close proximity to wind turbines, however scientific research has not supported these claims. An Expert Panel undertook a review on behalf of Renewable UK in July 2010 to assess the available scientific evidence relating to infrasound generated by wind turbines in a phenomenon known as Wind Turbine Syndrome (WTS). This report was entitled 'Wind Turbine Syndrome – An Independent Review of the State of Knowledge about the Alleged Health Conditions. This report followed a previous publication by Dr. Pierpont entitled 'Wind Turbine Syndrome' in 2009. The 2010 report assesses the impact of low-frequency noise from wind turbines on humans. The principal conclusions drawn by this expert panel are:

- "The scientific and epidemiological methodology and conclusions drawn (in the 2009 book) are fundamentally flawed;
- The scientific and audiological assumptions presented by Dr. Pierpoint relating infrasound to WTS are wrong; and
- Noise from Wind Turbines cannot contribute to the symptoms reported by Dr. Pierpoint's respondents by the mechanisms proposed"

In July 2012, Health Canada undertook a large-scale epidemiology study in collaboration with Statistics Canada, titled "Community Noise and Health Study"

The study considered physical health measures that assessed stress levels using hair cortisol, blood pressure and resting heart rate, as well as measures of sleep quality. More than 4,000 hours of wind turbine noise measurements were collected and a total of 1,238 households participated.

This study's results did not support a link between wind turbine noise and stress, or sleep quality (self-reported or measured). However, an association was found between increased levels of wind turbine noise and individuals reporting being annoyed.

With regards to turbine infrastructure, the Department of the Environment, Heritage and Local Government's Wind Energy Development Guidelines for Planning Authorities, 2006 identifies no specific safety considerations in respect of the operation of wind turbines. The DoEHLG's Guidelines note a limited possibility for injury arising from flying ice fragments or a damaged blade. Turbine technology will prevent the infrastructure from operating in the event that ice is present or in the event that a blade is damaged, minimising the potential for possible injury.

In terms of perceived effects from shadow flicker and noise, a shadow flicker assessment has been conducted and is included in Chapter 7 of this EIAR and a noise impact assessment is included in Chapter 8. In relation to shadow flicker, there will be no exceedances of the guideline limits as the Developer has committed to zero shadow flicker. In term of noise, operational wind farm noise levels will meet the derived night and daytime noise limits at all residential properties surrounding the wind farm. The impact under this criterion, is not considered to be of a significant magnitude.

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

Wind turbines, like all electrical equipment, produce electro-magnetic radiation. Underground electricity cables with capacities similar to those proposed are however common throughout Ireland and the installation to the required specification does not give rise to health concerns.

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

In 2009 the international commission on Non-Ionising Radiation Protection (ICNIRP) issued guidelines for exposure for members of the public to DC magnetic fields. Other more recent reviews have been performed for the UK's Health Protection Agency (2008) and the European Union's Scientific Committee on Emerging and Newly Identified Health Risks (2007, 2009). The Eirgrid (2014) report notes that:

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

None of the above outlined agencies as set out in the Eirgrid (2014) report have concluded that exposure to extremely low frequency (ELF) EMF from power lines or other electrical sources is a cause of any long-term adverse effects on human, plant, or animal health.

To ensure such adverse effects do not occur, the WHO recommends that policy-makers establish guidelines for EMF exposure limits and other control measures that provide the same or similar level of health protection for all people, and endorses the use of ICNIRP guidelines.

In 2010, ICNIRP issued updated guidelines, which reviewed the research since the 1998 report and replaced previous recommendations given by ICNIRP for this frequency range. The proposed development, specifically the underground cable to be installed complies with these ICNIRP guidelines.

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

Magnetic flux densities for Alternating Current (AC) magnetic fields are reported using units of microtesla (μT) and electric fields in kilovolts per metre (kV/m). The ICNIRP guidelines formed the basis of the EU guidelines for human exposure to EMF (EU, 1999).

In November 2010, the ICNIRP updated their guidance in this kV/m and μT frequency range. The 2010 document introduced new Reference Levels (i.e. guidelines) based on the latest exposure dosimetry techniques.

Table 6-13: Reference Levels for EMF

Exposure Characteristics	Electric Field Strength (kV/m)	Magnetic Flux Density (μT)
ICNIRP 1998 General Public Reference Level	5	100
ICNIRP 2010 General Public Reference Level	5	200

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

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

Due to the characteristics of the proposed development, there will be no impact on residential properties at any distance from the proposed development as the ICNIRP guidelines levels are not exceeded at any of the relevant distances including the ground directly above the cables.

The scientific consensus, as expressed most recently by the WHO, is that the research does not suggest that ELF-EMF causes any health effects at the levels typically encountered in our environments. Authoritative scientific organisations have not recommended exposure limits at these levels or steps to reduce exposure.

In the case of the proposed grid connection between the proposed wind farm development and the future proposed substation at Bracklone in Portarlington, the electric and magnetic fields expected to be associated with the operation of the proposed cable fully complies with the ICNIRP and EU guidelines on exposure of the general public to ELF EMF.

6.7.3.4 Vulnerability of the Project to Natural Disasters

Should a major accident or natural disaster occur, the potential sources of pollution onsite during the construction, operational and decommissioning phases of the Dernacart Wind Farm development are limited. The primary sources of pollution with potential to cause significant environmental pollution and associated negative impacts on human health include the bulk storage of fuel for machinery and generators, hydrocarbons, chemicals and wastes. In the case of the proposed wind farm development site, bulk liquid storage of fuel or chemicals are very limited.

There is limited potential for significant natural disasters to occur at the proposed Dernacart Wind Farm. Ireland does not suffer from extreme temperatures like that of many countries at a similar latitude due to the dominant influence of the Gulf Stream. This provides Ireland with a mild temperate climate. However, Global climate change and rising temperatures are likely to increase frequency of storms. Potential impacts on the Dernacart Wind Farm from such storms include high winds and lightning strikes. Wind turbines are designed with safety features which activate in certain storm conditions. Examples of such safety features include automatic shutdown at certain wind speeds or after a period of prolonged wind speeds above a certain threshold. The turbines will also be equipped with lightning protection to protect against potential lightning strikes.

Potential natural disasters that may occur at the site are therefore limited to:

- Flooding;
- Fire; and
- Major incidents involving dangerous substances.

In respect of flooding the turbines are sited on elevated land to capture wind speeds and in any case wind turbines are not considered to be vulnerable infrastructure with regard to flooding. Vulnerable infrastructure such as substations are located outside of any potential flood zones. Accordingly, the risk of impact from flooding in this area is reduced as water will filter down the water table via gravity. Drainage infrastructure is also proposed as part of the proposed development and this is assessed in greater detail in Chapter 14 Hydrology and Water Quality.

In respect of fire, there was a case in Galway in May 2017 where a major fire incident took place close to the 169MW Galway Wind Park site in Cloosh Wind Farm. Fire hazards exist around the proposed wind farm development, in particular, given that part of the site is adjacent to forestry. While fire plans are not a requirement for private forestry they represent best practice and help in the prevention of forest fires.

Major industrial accidents involving dangerous substances pose a significant risk to human health and to the environment both on and off the site of the accident. The proposed wind farm site is not close to any site regulated under the Control of Major Accident Hazards Involving Dangerous Substances Regulations i.e. SEVESO site, that would fall within the consultation radius distance from a SEVESO site as per Development Plan policy.

There are two SEVESO sites categorised as lower tier within 20km of the proposed wind farm.

- William Grant & Sons Irish Brands Ltd (Tullamore Distillery) is located at Clonminch, Tullamore, Co. Offaly approximately 15.4 km to the north west;
- Synergy Health Ireland Ltd is located in the IDA Business Park, Tullamore, Co. Offaly approximately 18.65 km to the north west

Due to the distance no impacts on the SEVESO sites will occur and no consultation is required. There are no upper tier SEVESO sites in the vicinity of the Dernacart Wind farm.

Given the development characteristics coupled with the distance to Seveso sites, the risk of impacts arising from such occurrences on the proposed development is low.

6.7.4 Potential Impacts – Decommissioning – Human Health

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

Decommissioning works will include removal of all above ground structures including the turbines, mountings, substations, and fencing. The relatively small footprint of the turbines and ancillary structures means that following removal, the site can be substantially returned to its existing condition quite quickly and leave little trace that a wind farm previously existed.

There will be no negative impact on human health arising from the decommissioning phase.

6.7.5 Mitigation Measures

6.7.5.1 Construction Health and Safety Mitigation Measures

In accordance with the requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2013 a Preliminary site-specific Safety and Health Management Plan has been for the project and is included in the Outline CEMP contained in Appendix 4.2 of Volume 3 EIAR Appendices.

The Safety and Health Management Plan will be finalised in accordance with this outline plan following the appointment of the main contractor for the construction works.

All hazards will be identified, and risks assessed. Where elimination of the risk is not feasible, appropriate mitigation and/or control measures will be established. The contractor will be obliged both under the construction contract and in accordance with all relevant health and safety legislation to adequately identify all hazards and eliminate them, or if this is not possible to minimise the risks associated with the construction phase of the project.

Safe Pass is a safety awareness training programme for construction workers. FÁS Safe Pass registration cards, which is a record of this training, are required for all construction, delivery and security staff on the site. Construction operatives will hold a valid Construction Skills Certificate Scheme card where required.

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

Public safety will be addressed by providing appropriate information through local consultation and by restricting site access during construction. Appropriate warning signs will be posted, directing all visitors to the site manager.

6.7.5.2 Operational Health and Safety Mitigation Measures

No mitigation measures are required in relation to people and animals during the operational phase of the development.

For security purposes, access points to the towers and the substation compound are secured by locks and access will not be obtained without the corresponding keys. The substation will be enclosed by palisade fencing and equipped with intruder and fire alarms in line with ESB and EirGrid standards.

Fall protection in the form of a safety harness will be provided to allow personnel access to the nacelle. This refers to the part of the turbine which covers the generating components at the top of the turbine tower. Personnel will be connected to a central line running behind the ladder from the safety harness. This will prevent personnel from freefalling more than a few centimetres, hence reducing the potential for injury.

Adequate clearance of structures from overhead power lines will be provided. In this case, all on-site electrical connections are carried by underground cable.

There will be lightning conductors on each turbine as all structures standing tall in the sky require protection and turbines in particular to allow surge protection to electrical components.

As no impacts from ELF-EMF have been identified, mitigation measures are not included.

6.7.5.3 Human Health for Operational Stage

As no impacts from ELF-EMF have been identified, mitigation measures are not included.

No mitigation measures are required in relation to any aspects of human health during the operational stage of the proposed development.

6.7.6 Residual Impacts

Once construction mitigation measures are put in place, health and safety risks associated with the development are considered to be similar to those of a typical construction site.

There are no operational risks associated with the operation of the wind turbines and cables and once normal safety measures are implemented, and the substation will not have impact on human health and/or safety.

6.8 Material Assets

6.8.1 Introduction

This section provides an overview of the material assets (renewable and non-renewable resources, and utility infrastructure) of the receiving environment to enable an assessment of the potential effects of the proposed development on Material Assets.

6.8.2 Existing Environment - Material Assets

6.8.2.1 Non-Renewable Resources

It is proposed to haul construction materials, from existing quarries and pits in the vicinity of the proposed development. These quarries and pits provide sources of aggregates, hardcore, fill materials, washed sand and gravel, pebble sand aggregates, ready mix concrete, and mortar.

In terms of non-renewable resources within the site area, there is peat beneath areas of forestry in the northern part of the site.

6.8.3 Potential Impacts – Construction - Material Assets

6.8.3.1 Non-renewable Resources

The construction of the wind farm will impact on natural resources such as aggregates which will be sourced from quarries and pits within the area – please refer to Chapter 13: Land, Soils and Geology for further details. Existing tracks will be used where possible and the layout has been designed to minimise the length of new track required. This will contribute to minimising the requirement for such stone material.

Peat will be excavated in areas of forestry where tree felling is required to facilitate development works relating to the wind farm. Surplus peat will be used to form berms along the access roads within the site.

6.8.3.2 Renewable Resources

The proposed development is intended to capture the renewable wind resource at the site and is located within an area determined by SEAI as having excellent wind resources for wind farm development. There will be no negative effects on the renewable energy resource of the receiving environment.

It is considered that the proposed development will have an overall positive impact in terms of reducing carbon emissions and climate change. It will assist Ireland in meeting its target of reducing emissions by 30% by 2030 as set out by the European Commission and the Climate and Energy Framework which is driven by the requirements for a reduction in greenhouse gas emissions along with energy security and competitiveness. Further to this, the Recast Renewable Energy Directive (RED2) sets out a binding renewable energy target for the EU of 2030 of 32%.

Any trees felled for wind farm purposes will be compensated for by planting a tree at another unplanted location as set out in Irish Forest Service Guidelines. The proposed development will require the felling of forestry within and around the wind farm infrastructure to accommodate the construction of turbine foundations, hard stands, crane pads, access tracks and the substation. The estimated area of infrastructural tree clearing required for the proposed wind farm will be approximately 18 ha. A felling licence will be in place from the Forest Service prior to any tree felling and will include the provision of relevant tree planting to be carried out in lieu of the trees felled on the site. The overall effect of the proposed wind farm development on renewable resources will be neutral.

6.8.3.3 Utilities Infrastructure

Utilities such as overhead power lines, telephone lines or underground services may require diversion or be temporarily disrupted during the construction of the wind farm development.

This has the potential to have a negative temporary impact on nearby dwellings and commercial/industrial activities. Potential effects on telecommunications are discussed in Chapter 15.

The construction of the cable trenches, along c. 16km public roads, will have a negative temporary impact on the roads concerned during construction, with some roads likely to require re-surfacing. Importation of materials and equipment for Dernacart Wind Farm will also increase shipping traffic at the ports being used and increase freight on the motorway, national primary route and regional road network along the designated haulage routes.

6.8.4 Potential Impacts – Operation- Material Assets

Once the Dernacart Wind Farm development is operational, the potential for negative effects on material assets is minimal.

It is likely that a small amount of aggregate / granular material is required to maintain access tracks throughout the operational phase.

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

6.8.5 Potential Impacts – Decommissioning - Material Assets

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

Decommissioning works will include removal of all above ground structures including the turbines, mountings, substations, and fencing. The relatively small footprint of the turbines and ancillary structures means that following removal, the site can be substantially returned to its existing condition quite quickly and leave little trace that a wind farm previously existed.

There will be no negative impact on material assets arising from the decommissioning phase.

6.8.6 Mitigation Measures

During construction, it is proposed to undertake slit trenching to identify existing underground services along the proposed cable routes. This will minimise the likelihood of disruption or damage to existing utilities. It is not intended to divert existing services but instead where possible the cable will be laid above or below existing services. Communication with the relevant services providers will be maintained for the duration of the construction works.

Non-renewable resources will be sourced locally, insofar as possible to minimise transportation distances and indirect impacts on climate change.

6.8.7 Residual Impacts

While limited quantities of non-renewable resources such as aggregates and cement will be used to construct the wind farm, the proposed development will result in a positive residual impact on non-renewable resources by offsetting the use of fossil fuel in power generation.

6.9 Do-Nothing Scenario

In the event that the proposed wind farm development does not proceed, the existing agricultural and forestry related land use will continue for the foreseeable future.

In the absence of this proposed renewable energy development, the associated potential for reduction in greenhouse gas emissions from power generation will be lost, as will the opportunity to harness the full wind energy capacity of County Laois , further contributing to the State missing Governmental and EU targets for CO_2 reductions. Ireland is heavily dependent on the importation of fossil fuels to meet its energy needs, with imported fossil fuels accounting for 88% of all energy consumed in Ireland in 2015 at an estimated cost of €4.6 billion. According to the SEAI, approximately 66% of the electricity generated in Ireland was produced using imported fossil fuels in 2018. Ireland's import dependency prior to 2016 varied between 85% and 90% and decreased to 69% when the Corrib Gas started production. While lower levels of oil import are being achieved as a result of the growing wind energy sector, Ireland remains vulnerable to future energy crises and price fluctuations given its location on the periphery of Europe. This dependency on energy imports leaves Irish consumers exposed to fluctuating international oil and gas prices. Harvesting renewable, indigenous energy resources such as wind will help diversify the Irish generation portfolio and reduce our dependency on imported fuel resources.

If the wind farm development does not proceed, there will be no associated direct and indirect employment opportunities including those relating to the construction, operation and decommissioning of the wind farm, and other positive impacts such as the payment of rates to Laois County Council or the existence of the Community Benefit Scheme will not materialise.

6.10 Cumulative Impacts

6.10.1 Large Scale Projects

In terms of cumulative impacts of the proposed development in combination with other projects, a number of proposed large-scale projects within 20km of the proposed development are included in the list of developments provided in Appendix 6-1. In the event that these projects proceed to construction within the same time frame as Dernacart Wind Farm, there is potential for a positive cumulative impact in terms of construction jobs associated with the construction phase. This would have a temporary positive impact on socio economics, employment and economic activity. There is also potential for cumulative nuisance impacts upon human health due to increased traffic, noise and dust in the vicinity during the construction phase.

To mitigate potential impacts from traffic an outline Traffic Management Plan is included in the outline CEMP and this will be further developed prior to construction in consultation with Laois County Council. Potential impacts from dust are mitigated through the implementation of a dust minimisation plan. Potential noise impacts will also be mitigated, and it is expected that set noise levels which cannot be exceeded during construction will form part of the conditions associated with a Planning Permission. These mitigation measures and plans will be in place for all of the projects as these represent typical and standard conditions of planning. Following mitigation and best practice there will be a slight to negligible impact arising from other large-scale projects within 20km of the wind farm.

During the operational phase, no significant adverse cumulative effects are envisaged due to the lack of impacts arising from the proposed development. A positive cumulative impact will be the increase in clean renewable energy produced to the national grid from the Dernacart Wind Farm and solar energy farms in the vicinity.

6.10.2 Bracklone Substation

Cumulative impacts were assessed in relation to the future proposed Bracklone 110kV substation as the Dernacart Wind Farm seeks to connect to the national grid at this location. The proposed substation is to be located in the Bracklone townland adjacent to the R420 regional road at the eastern edge of Portarlington.

In terms of land use the proposed substation will change the existing land use from unused agricultural land to energy infrastructure. While this impact is permanent the change of use is not detrimental given the small area of land occupied by the substation relative to the amount of agricultural land in the surrounding area.

In terms of population the proposed substation will have no impact during the construction or operational phases. In terms of social economics, employment and economic activity the Bracklone substation will have a slight positive impact during the construction phase as the construction of the substation will require construction workers, and this may represent job opportunities for people living in Portarlington and the surrounding area.

There is a negligible impact in terms of social, economics, employment and economic activity in terms of the operational phase. In terms of material assets, the Bracklone substation will have a slight positive effect in the operational phase as it will provide additional electricity infrastructure to the area. There will be no impact on tourism and amenity during the construction or operational phase due to the limited size of the development and its distance from tourism and amenity sites.

Overall the future proposed Bracklone 110kV substation will present a slight to negligible impact during the construction phase of development due to change in land use and construction impacts such as dust and traffic. However, the construction of the substation could potentially represent job opportunities for construction workers in the local area.

During the operational phase the substation will provide a slight to negligible positive impact as it provides additional infrastructure to the national and local electricity network.

6.11 Conclusion

The potential effects of the proposed wind farm development on Population, Human Health and Material Assets have been assessed.

As detailed in Section 6.4: Socio-Economics, Employment and Economic Activity, the socio-economic impact of the proposed wind farm development is expected to be positive due to enhanced direct and indirect employment opportunities and economic activity associated with the construction, operation, and decommissioning of the wind farm.

The project will contribute to reducing the State's dependency on fossil fuels and the importation of fuel for energy requirements. The development will positively contribute to reduced greenhouse gas emissions from power generation and assist the State in achieving its renewable energy targets.

Once mitigation measures are implemented, none of the residual effects arising from the proposed development will be significant in terms of impact on population, human health and material assets.

Potential effects in relation to noise, air quality, visual impact and shadow flicker during the construction and operational phases of the proposed development are discussed in their respective chapters of the EIAR.

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