# Chapter 17: Site Selection and Alternatives

## Coolglass Wind Farm Vol. 2 EIAR

Coolglass Wind Farm Limited

Prepared by:

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# Acronyms and Abbreviations

| | |
|---|---|
| SLR | SLR Consulting Limited |
| EIAR | Environmental Impact Assessment Report |
| EIA | Environmental Impact Assessment |
| EU | European Union |
| PV | Photovoltaics |
| SAC | Special Area of Conservation |
| SPA | Special Protection Area |
| NHA | Natural Heritage Area |
| pNHA | Proposed Natural Heritage Areas |
| SEAI | Sustainable Energy Authority of Ireland |
| EPA | Environmental Protection Agency |
| SEA | Strategic Environmental Assessment |
| CSO | Central Statistics Office |
| TuOS | Transmission Use of System Values |
| TLAF | Transmission Loss Adjustment Factor |
| GTUoS | Generator Transmission Use of System |
| LCAs | Landscape Character Assessments |
| SEA | Strategic Environmental Assessment |
| CDP | County Development Plan |
| DoEHLG | Department of Environment, Heritage and Local Government |
| ABP | An Bord Pleanála |
| SID | Strategic Infrastructure Development |
| TBD. | To Be Determined |

# 17.0 Site Selection and Alternatives

## 17.1 Introduction

The following chapter sets out the need for the development with respect to climate change, national policy and national renewable energy targets. Following the establishment of the need for the development, the chapter details the reasonable alternatives studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparisons of the environmental effects. It describes the site screening process, alternative design philosophies considered, alternative site layouts, the do-nothing alternative and alternative processes. Statement of Authority

This chapter has been prepared by Crystal Leiker, BA M.PLAN, Principal Planner at SLR and Edward Goulding, BA MSc, Graduate Planner from SLR Consulting.

- Crystal is a Principal Planner working for SLR Consulting and holds an M.PLAN in Planning and Sustainable Development. Crystal has 5 years in the preparation and contribution to site selection EIAR chapters.
- Edward is a graduate planner with SLR consulting and has 2 years' experience in planning and consultation and one year in the contribution to site selection chapters.

## 17.2 Alternatives Considered

The requirement in relation to alternatives in the EIA process is set out in Directive 2011/92/EU, amended by Directive 2014/52/EU "the EIA Directive", in Article 5 (1)(d), which states that an EIAR should include:

> *"A description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment"*

Article 5(1)(f) of the EIA Directive requires that the EIAR contains *"any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected."*

Annex IV of the EIA Directive states that the information provided in an Environmental Impact Assessment Report (EIAR) should include a:

> *"Description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects."*

Accordingly, this EIAR is for the development of a wind farm. Part of the selection process is the proximity of the wind farm to a suitable substation to connect a renewable project to the National Grid. Once the wind farm location has been determined, a number of potential cable routes are analysed through a number of factors such as length, population centres and terrain before the best route is selected.

This section has particular regard to the environmental considerations which influenced the selection of alternatives for the Proposed Development and details the evolution of the development through alternatives considered, indicating the main reasons for selecting the chosen option taking into account the effects of the Project on the environment.

The alternatives considered have been described in line with the draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (May, 2022). The Guidelines state that:

> *'The objective is for the developer to present a representative range of the practicable alternatives considered. The alternatives should be described with 'an indication of the main reasons for selecting the chosen option'. It is generally sufficient to provide a broad description of each main alternative and the key issues associated with each, showing how environmental considerations were taken into account in deciding on the selected option. A detailed assessment (or 'mini-EIA') of each alternative is not required'*

Furthermore, the Guidelines note the following regarding high level plans and strategies that may influence or pre-determine decisions in the development process:

> *'Higher level alternatives may already have been addressed during the strategic environmental assessment of relevant strategies or plans. Assessment at that tier is likely to have taken account of environmental considerations associated, for example, with the cumulative impact of an area zoned for industry on a sensitive landscape. Note also that plan level/higher-level assessments may have set out project-level objectives or other mitigation that the project and its EIAR should be cognisant of. Thus, these prior assessments of strategic alternatives may be taken into account and referred to in the EIAR.'*

The section also details non-environmental factors of the development process that are relevant to the evolution of the Proposed Development.

The reasonable alternatives considered in undertaking this EIAR were therefore as follows:

- 'Do Nothing' alternative.
- Alternative locations;
- Alternative technologies;
- Alternative design and layouts;
- Alternative cable routes;
- Alternative haul routes; and
- Alternative forestry replant lands.

Each of these alternatives were considered relevant to the Project and its specific characteristics and are discussed in further detail below, including an assessment and comparison of likely significant environmental effects, and indicating the main reasons for choosing the development, as proposed.

### 17.2.1 Macro Level Search

There are various sources of guidance with regards to the assessment and management of shadow flicker impacts caused by wind turbines. However, in alignment with the DoEHLG's

Draft Revised Wind Energy Development Guidelines (December 2019)., the client has committed to zero shadow flicker. Irish guidance relevant to the Proposed Development is summarised below.

A rigorous strategic national site selection process was undertaken to identify the optimum site to accommodate the Proposed Development.

The site selection process at a macro level takes account of relevant International, National and Regional policies, as well as the principle environmental, planning and technical criteria that determine the feasibility and suitability of the existing environment to absorb wind farm developments.

The primary macro level considerations in the identification of a broad area for wind energy development included the following considerations:

1 Identification of environmental designations on a National Scale;

2 Identification of areas of built Wind Farms in Ireland;

3 Identification of Grid Capacity and Electricity Infrastructure;

4 Assessment of National Transmission Loss Adjustment Factor and Generator Transmission Uses or System Change;

5 Population Density; and

6 Relevant International, National and Regional Policies.

### Environmental Designations

An assessment of environmental designations (SAC's, SPA's, pNHAs) identified the west and eastern seaboards of the Country as having dense levels of European and National environmental designations. This is demonstrated in **Plate 17-1**.

### Built Wind Farms

According to the SEAI Wind Mapping System, as of February 2023 there are over 300 operational wind farms across Ireland (teal) with a number of contracted wind farms up and coming (amber). **Plate 17-2**Error! Reference source not found. demonstrates their spatial extent.

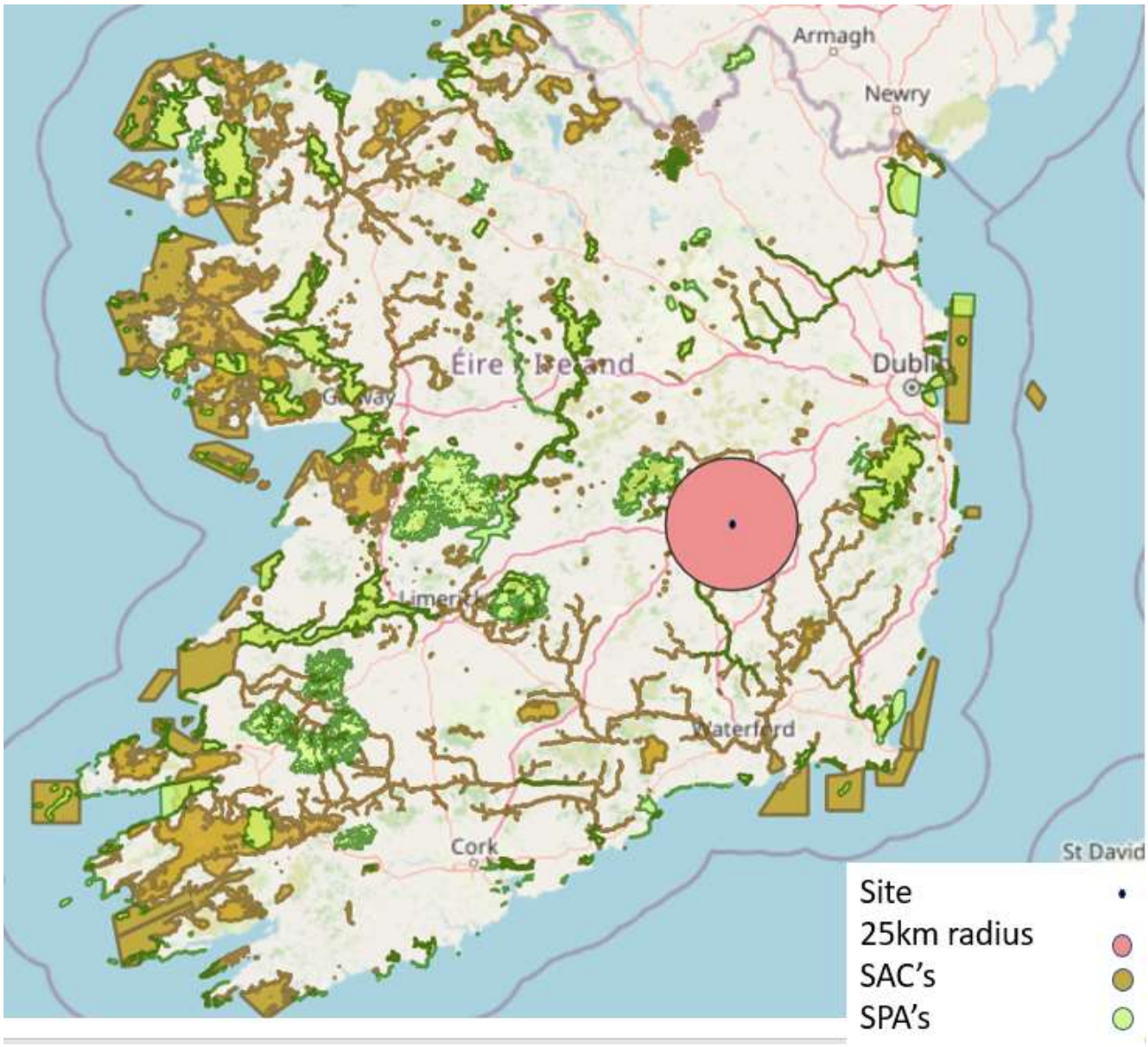



**Plate 17-1 Environmental Designations in Ireland**

*(Source: EPA Map Viewer)*

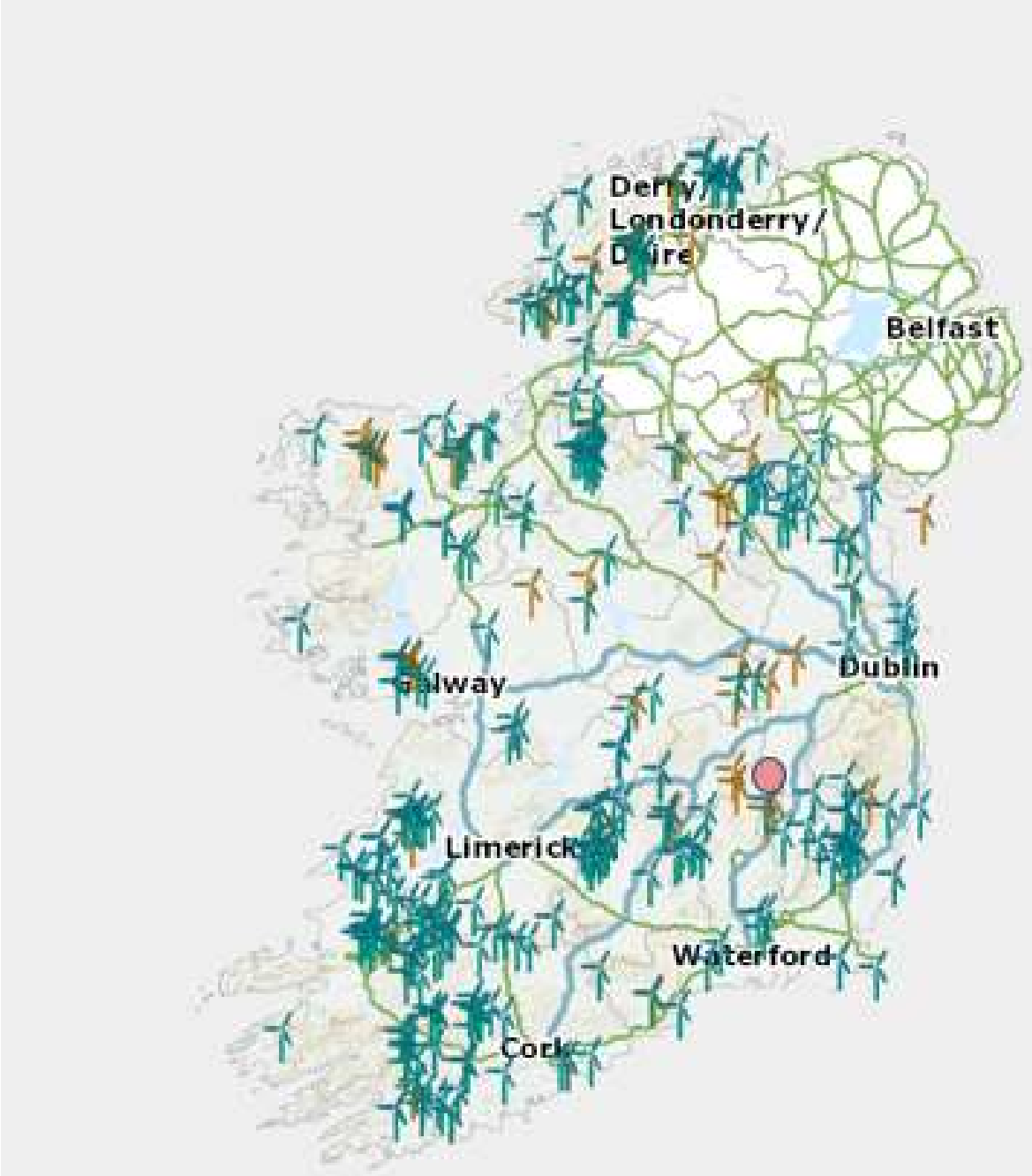



**Plate 17-2 SEAI Connected and Contracted Wind Farms in Ireland**

*(Source: SEA Wind Mapping System)*

As can be seen from **Plate 17-2**, the currently operational wind farms are clustered in the southwest, northwest and southeast of the country, while the contracted wind farms are clustered more within the midlands.

## Capacity on the Electrical Grid

Electrical grid capacity has become a critical issue for site selection. At the time of site selection in 2020, a desktop review of the capacity assessment of the grid[1] was undertaken to ascertain where capacity might be available for the provision of a new wind energy project at a national scale to determine at a regional scale, areas suitable for wind energy development with capacity. The Midlands Region and parts of the Greater Dublin area were identified as most likely.

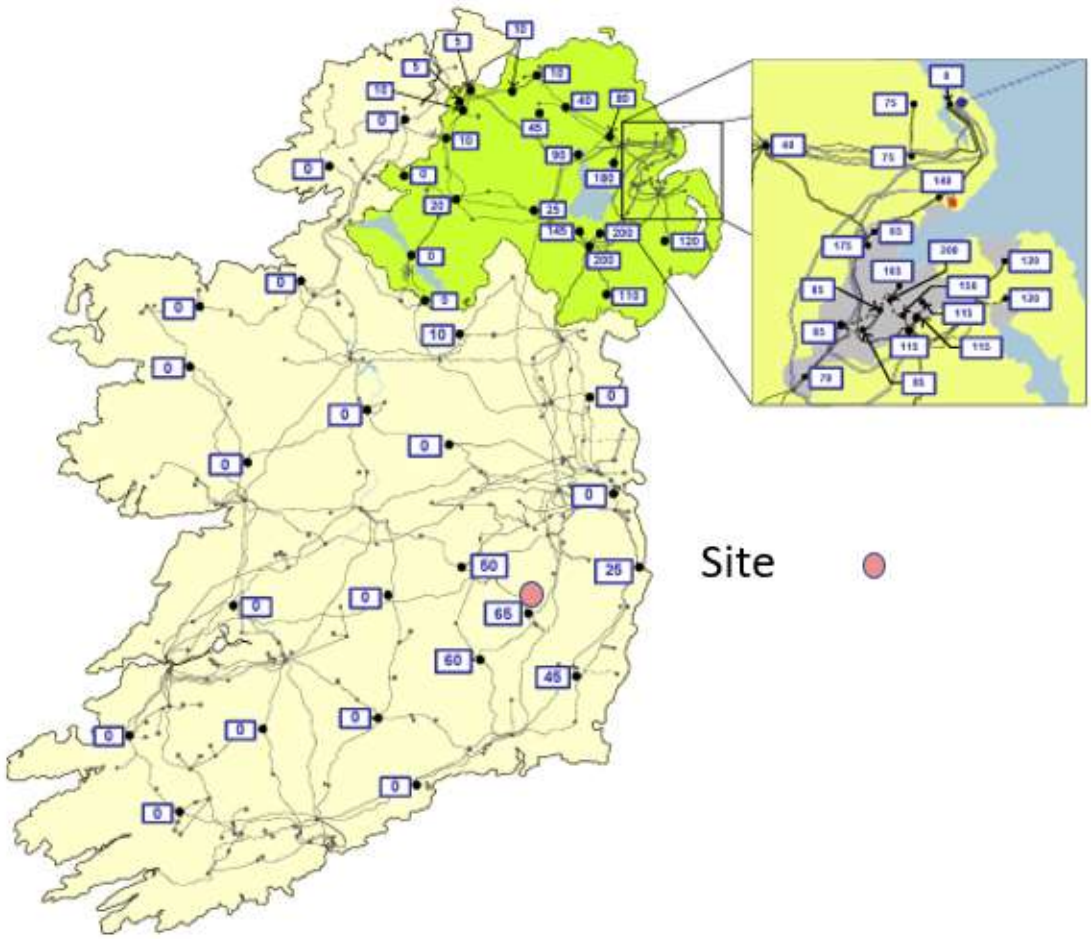



**Plate 17-3 Generation Opportunity at 110kV substations in2030:[2]**

**Plate 17-3** demonstrates the potential opportunities for electricity generation by 2030. The EirGrid All Island 10 Year Transmission Forecast Statement 2021 notes that

> *Some capacity for additional generation is available within the 110 kV network at some nodes in the South-East and Midlands of Ireland. This is due to the presence of large demand centres, the lower penetration of renewable generation, as well as the strength of the transmission network in this region.*

[1]EirGrid All Island 10 Year Transmission Forecast Statement 2021: https://www.eirgridgroup.com/site-files/library/EirGrid/All-Island-Ten-Year-Transmission-Forecast-Statement-TYTFS-2021.pdf

[2] EirGrid All Island 10 Year Transmission Forecast Statement 2021

***National Transmission Loss Adjustment Factor and Generator Transmission Uses***

Two factors demonstrate the areas of the grid network suitable for wind generation:

- Transmission Use of System Values (TuOS) (demonstrated in **Plate 17-4**) and
- Transmission Loss Adjustment Factor (TLAF) (demonstrated in **Plate 17-5**).

The EirGrid All Ireland 10 year Transmission Forecast sets out the TUoS and TLAF changes over 2020-2021. EirGrid would apply one of its lowest TuOS values to a project connecting in this area which is primarily due to the existing capacity that exists in the network which means that less network reinforcements are required in the area to facilitate the power from the Proposed Development. At the time of the site selection for the Proposed Development, two areas were identified with the area of highest infrastructure capacity- these include Munster and Connacht followed by the midlands areas of Laois and Offaly as demonstrated in **Plate 17-6**. These areas of the grid network are particularly suitable for the connection of wind generation from a grid system operator's perspective.

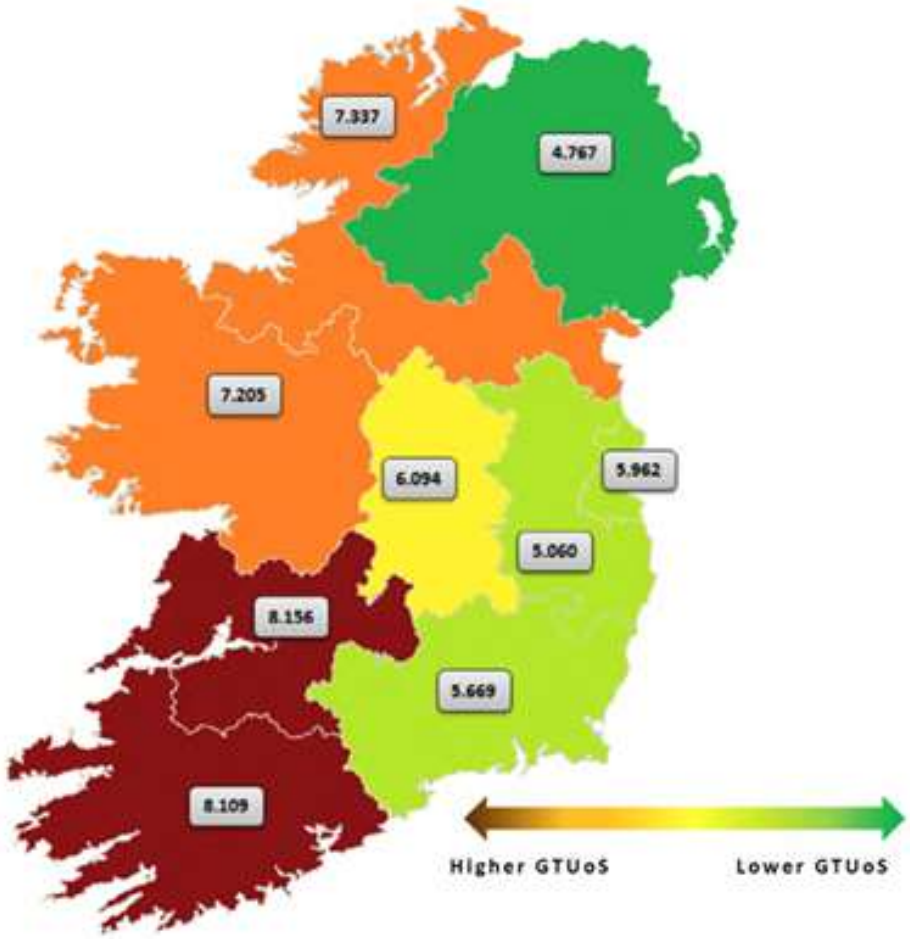



**Plate 17-4 All Island 2021 Regional Average GTUoS Values[3]**

[3] EirGrid All Island 10 Year Transmission Forecast Statement 2021

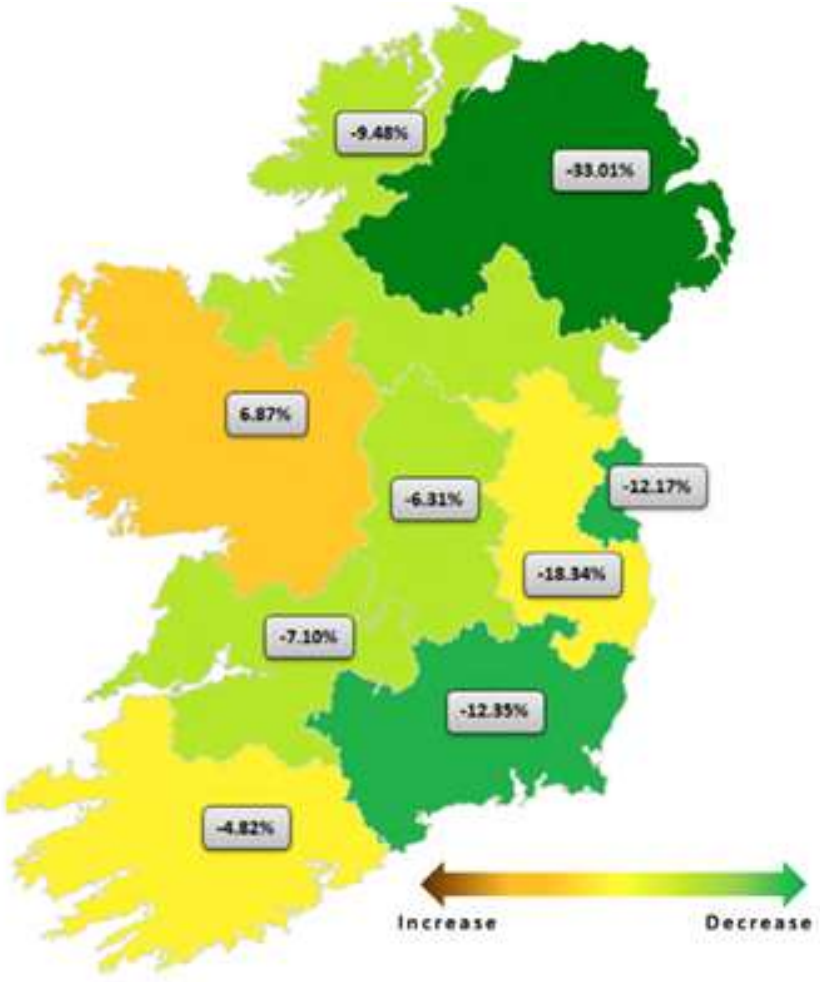



**Plate 17-5 All Island 2020/2021 - 2021/2022 Regional Average TLAF Values**

## Population Density

An analysis of 2022 Census data provides information on population density by county as set out in **Table 17-1**. Population is denser within the urban centres of Dublin and Cork, spreading through their wider catchment area.

**Table 17-1 CSO 2022 Population Density by County**

| CensusYear | County | Population by Area | County by Size km2 | Pop Density |
|---|---|---|---|---|
| 2022 | Co. Carlow | 61,931 | 897 | 69.04 |
| 2022 | Co. Cavan | 81,201 | 1,932 | 42.03 |
| 2022 | Co. Clare | 127,419 | 3,450 | 36.93 |
| 2022 | Co. Cork | 581,231 | 7,500 | 77.50 |
| 2022 | Co. Donegal | 166,321 | 4,860 | 34.22 |
| 2022 | Co. Dublin | 1,450,701 | 922 | 1573.43 |
| 2022 | Co. Galway | 276,451 | 6,151 | 44.94 |
| 2022 | Co. Kerry | 155,258 | 4,807 | 32.30 |
| 2022 | Co. Kildare | 246,977 | 1,695 | 145.71 |
| 2022 | Co. Kilkenny | 103,685 | 2,073 | 50.02 |
| 2022 | Co. Laois | 91,657 | 1,720 | 53.29 |
| 2022 | Co. Leitrim | 35,087 | 1,589 | 22.08 |
| 2022 | Co. Limerick | 205,444 | 2,756 | 74.54 |
| 2022 | Co. Longford | 46,634 | 1,091 | 42.74 |
| 2022 | Co. Louth | 139,100 | 826 | 168.40 |
| 2022 | Co. Mayo | 137,231 | 5,588 | 24.56 |
| 2022 | Co. Meath | 220,296 | 2,342 | 94.06 |
| 2022 | Co. Monaghan | 64,832 | 1,295 | 50.06 |
| 2022 | Co. Offaly | 82,668 | 2,001 | 41.31 |
| 2022 | Co. Roscommon | 69,995 | 2,548 | 27.47 |
| 2022 | Co. Sligo | 69,819 | 1,837 | 38.01 |
| 2022 | Co. Tipperary | 167,661 | 4,305 | 38.95 |
| 2022 | Co. Waterford | 127,085 | 1,857 | 68.44 |
| 2022 | Co. Westmeath | 95,840 | 1,840 | 52.09 |
| 2022 | Co. Wexford | 163,527 | 2,367 | 69.09 |
| 2022 | Co. Wicklow | 155,485 | 2,027 | 76.71 |
| 2022 | Ireland | 5,123,536 | | |

The midland counties show a moderate to lower population density, being removed from urban centres. Counties Laois, Kilkenny and Offaly have a lower population density between 40-50 persons per square kilometre. Lower population densities can be found in Counties Clare, Donegal and Kerry, however as demonstrated in **Table 17-1**, these areas have higher GTUoS values with a lower capacity for grid transmission. When all factors, such as proximity to environmental designations, quantum of constructed wind farms, grid capacity and population density, the midlands area was considered the most feasible overall.

## Relevant Regional and National Policies

### National Level

A comprehensive assessment of policy is set out in Chapter 4 of this EIAR. With regard to wind energy development, page 122 of the NPF states:

> *Ireland's national energy policy is focused on three pillars: (1) sustainability, (2) security of supply and (3) competitiveness. The Government recognise that Ireland must reduce greenhouse gas emissions from the energy sector by at least 80% by 2050, compared to 1990 levels, while at the same time ensuring security of supply of competitive energy sources to our citizens and businesses.*

In relation to the siting of wind farm developments, the NPF states:

> *Increases in population, economic growth, higher levels of food demand, transitioning to a more sustainable energy market and conservation goals will ultimately result in increased competition for suitable land to facilitate these accumulating pressures. Some parts of Ireland are more suitable than others for facilitating particular national sectoral aims by reason of physical factors, environmental sensitivities, land capacity and existing settlement patterns.*

In addition to the NPF, the Climate Action Plan is the foremost national climate change document within the Republic of Ireland and provides the guidance for development targeting climate mitigation accordingly.

The Irish Government published its Climate Action Plan 2023 on 21 December 2022 (DECC, 2022[4]). The Climate Action Plan 2023 is the second annual update to Ireland's ongoing Climate Action Plan, which was first published in 2019.

The revised plan implements the carbon budgets and sectoral emissions ceilings and sets a roadmap for taking decisive action to halve Ireland's emissions by 2030 and reach net zero no later than 2050, as committed to in the Programme for Government.

The Climate Action Plan (2023) recognises that Ireland must make a significant increase in the current levels of renewable energy production in the country. This is stated as one of the most important measures in increasing the proportion of renewable electricity to up to 80% by 2030 and a target of 9 GW from onshore wind, 8 GW from solar, and at least 5 GW of offshore wind energy by 2030.

**Regional Level**

At the time of the siting of the Proposed Development, the Regional Spatial and Economic Strategy for the Eastern and Midland Region was the foremost regional planning document within the Republic of Ireland. Page 181 of the RSES notes that:

> *Incorporating renewable energy within Ireland's energy supply may improve the resilience of energy infrastructure as reliance on energy imports and the associated concentrated infrastructure is reduced. Distributed renewable energy sources can contribute to local energy system resilience. For example, during both Storm Ophelia and Storm Emma, when the operation of many of Ireland's infrastructures was challenged, wind energy maintained output throughout the adverse conditions and contributed to maintaining local supply and post event recovery to normal operation. The Region should promote best practice in resilience in critical infrastructure, including implementation of emerging European best practice in this regard.*

### 17.2.2 Micro Level Search

A strategic search area of c. 25 km from Portlaoise was chosen, focusing on the central and southern midlands area, away from centres of population, with proximity to substations with high enough capacity to facilitate the operation of the Proposed Development. This search necessitated research into counties Laois, Offaly, Carlow and Kildare.

[4] Department of the Environment, Climate Change and Communications. Climate Action Plan 2023. Available at: https://www.gov.ie/en/publication/7bd8c-climate-action-plan-2023/

The micro level search criteria reflects the broad range of issues which can arise in wind farm development and allows for direct comparison across the study area to determine the relative suitability of potential wind energy development sites. The criteria includes the following:

- County Development Plan Policies and Designations
- Natura 2000 sites
- Areas in proximity to motorways
- Population density
- Cultural heritage sites
- Proximity to the National Electricity Grid
- Wind Speed

### County Development Plan Policies and Designations

A comprehensive assessment of local planning policy is contained in Chapter 4 of this EIAR. For the strategic site search area of which the Proposed Development is situate, key policies were consulted across the Laois area such as:

- Wind Energy Development Zonings
- Landscape Character Assessments
- Sensitive Landscapes
- Natura 2000 sites
- Cultural Heritage sites.

With respect to wind energy development zonings, these were not considered for the purposes of micro siting the Proposed Development, given the disparities between European / National policies and Local policies across the midlands region (see Chapter 4 of this EIAR for detailed assessment), however due consideration has been given for LCAs, sensitive landscapes, Natura 2000 sites and Cultural Heritage designations. As the Proposed Development evolved, wind energy development zonings were significantly changed, and due regard has been given to these changes in the assessment of the Proposed Development.

With respect to Landscape Character Assessments, a 25km search area from Portlaoise includes parts of the administrative areas of Laois, Kildare and Kilkenny Counties. The landscape generally correlates with the presence of upland areas and/or waterways, such as the Barrow River Corridor (within the Kildare, Carlow, Kilkenny County Development Plans/Landscape Character Assessments) and Castlecomer Plateau (in Laois, Carlow, Kilkenny County Development Plans/Landscape Character Assessments). In this case, the transition from these areas to the wider study area is generally defined by lower elevation, more level topography and the Barrow River Valley.

In the northern half of the study area, the landscape character is defined by developed pasture with a high degree of occupation and working peatlands. In the southern half of the study area, the landscape character is defined by rolling elevated topography, with minor waterways, associated valleys, and a high proportion of conifer forestry patches. The character can transition from open, with panoramic, elevated views to shallow valleys navigated by narrow local roads, generally with a high level of vegetation (further enclosing and limiting visibility).

## Natura 2000 sites

A NHA is a National designation introduced by the Wildlife (Amendment) Act 2000. Development within an NHA may be considered by the Minister and only permitted for 'imperative reasons of overriding public interest' including those of social or economic nature. In practice, development proposals within NHAs are typically refused or given consent with restrictive conditions.

SACs have been created by the Habitats Directive (92/43/EEC) to enable the protection, conservation and, where possible and necessary, restoration of certain habitats and/or species. Developments that may impact on priority habitats and/or species (rare habitats and species that have been given priority status in Ireland) may only be allowed for health and safety reasons whilst for non-priority habitats and/or species, permission may be granted on the basis of economic or social justification/reasoning. Whilst every individual project is considered on its own merits, wind farm developments proposed within the boundaries of the ecological designations above have been typically refused.

SPAs are very important areas that are designated by the EU Birds Directive (79/409/EEC) to protect rare or endangered birds and their habitats – especially wetlands used by migratory birds. Development is very rarely permitted in or adjacent to such areas.

The midlands area is characterised by peatlands, pastural and forestry lands with areas of undulating topography, but very few overland areas of SACs or SPAs. The notable exceptions are within peatlands areas such as the elevated Slieve Bloom Mountains SAC and SPA and the watercourses across the midlands, such as the River Barrow and River Nore SAC and SPA. Further north, designations on several bogs ruled out further investigation into County Offaly. From a Natura 2000 perspective, and with careful consideration of construction practices, it was determined that an area to the south of Portlaoise largely avoided Natura 2000 sites by way of its elevated location away from peatlands. However, it is worth noting that the Site does not have peat.

## Areas in Proximity to Motorways

The Dublin Airport Authority (DAA) and Department of Defence Irish Air Corps (Aircorps) have a requirement that wind farm developments are set back c. 3 nautical miles from any motorway as motorways are utilised as navigation tools for pilots traversing the country. While there have been some exceptions to this rule, a 3 NM buffer was applied to the study area around the M7 and M9 necessitating any potential wind developments to be south of Portlaoise when all other factors discussed in this section were taken into consideration. The closest extent of the Site to the closest extent of the motorway system is 5.32NM from the northern cluster of the Proposed Development to the southernmost extent of the M7 as it curves to the south of Portlaoise.

## Population density

The midlands areas as set out in Section 16.2.1 has a lower population density than areas within proximity to urban centres such as Cork and Dublin. With respect to recent housing and commuter trends, Kildare and Carlow were determined to be too high in population density to facilitate the construction and operation of the Proposed Development. However, Laois had significantly less population density than Kildare and was therefore chosen as the Proposed Development Site.

### Cultural Heritage Sites

A number of important cultural heritage site are located in the study area, such has the Rock of Dunamase and Emo Court. A desktop review of heritage sites across the study area indicated a large scattering of known archaeological monuments to the southeast of Portlaoise with a notable decrease in areas immediately west and areas to the south of Portlaoise. Protected structures largely centred around urban centres such as Portlaoise, Stradbally, and other urban areas.

### Proximity to the National Electricity Grid

Grid capacity is a significant problem across the country with some areas having more capacity than others. Within the study area, two new substations are currently permitted with the potential capacity required to take the electricity generated by the Proposed Development – these being the option 1 substation and the option 2 substation. Proximity to both substations was a consideration in the final site selection of the Proposed Development.

### Wind Speed

Wind development requires sustained wind speeds to be viable and generate sufficient electricity generation onto the grid. An examination of the Wind Atlas over the study area indicates that wind speeds average between 7.9 and 9.3 m/s. higher wind speeds occur at higher elevations as shown in **Plate 17-6**. Wind speeds were a consideration in the final site selection of the Proposed Development.

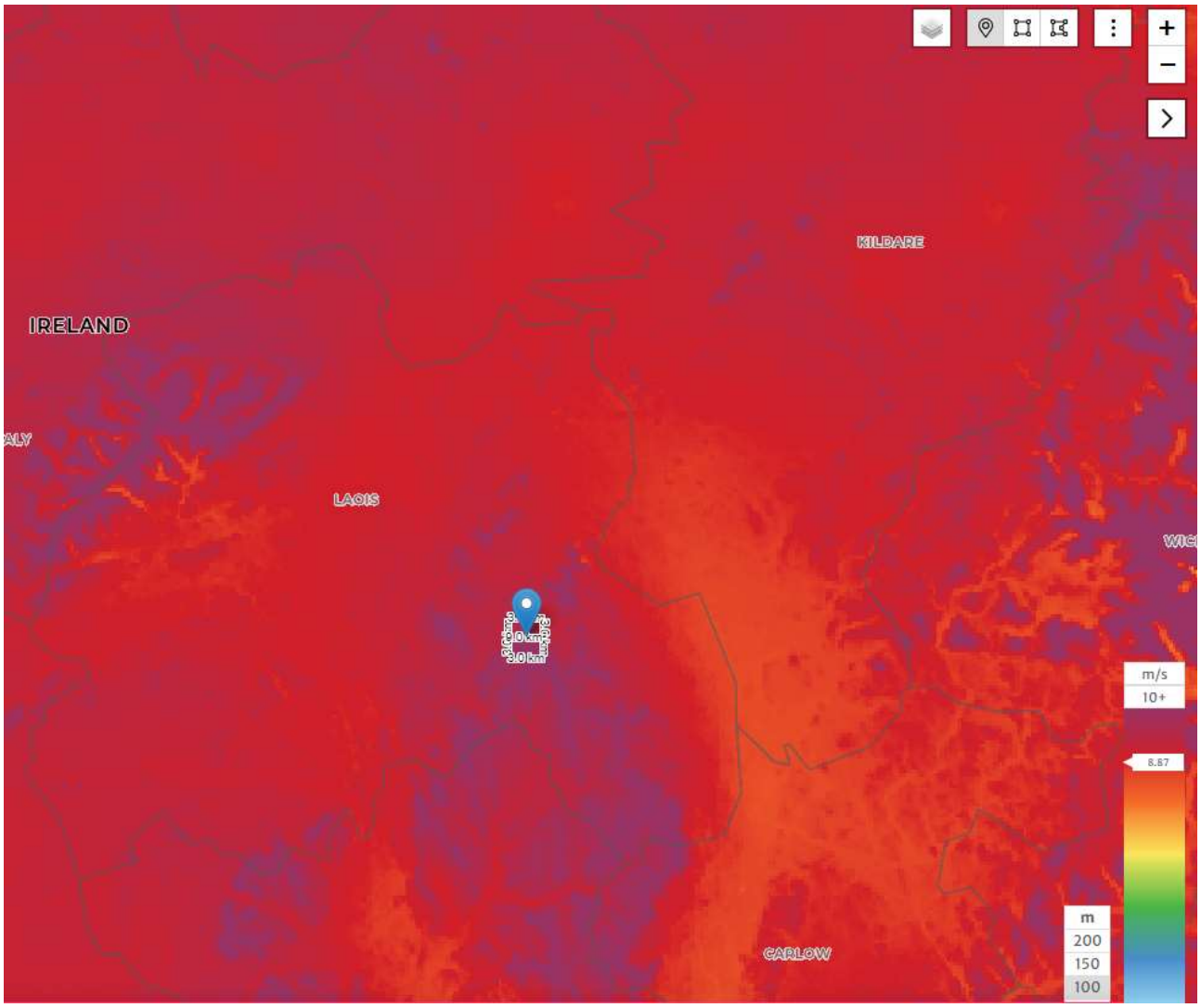



**Plate 17-6 Wind Speeds within the Study Area**

## Final Site Selection Area

The final site selection of the Proposed Development was influenced by a number of factors including landscape / land use, access and infrastructure, environmental considerations, population density and constructability.

**Landscape / landuse:** The receiving environment for the Proposed Development is an upland area which is common through the midlands of Ireland. The Site lies within upland areas with topography varying c. 100m across the site. It is characterised by commercial forestry plantation and areas of agricultural land and naturalising scrub. The site and its immediate environs are located within a landscape typical of the midlands area.

**Access and Infrastructure:** It is preferred to use sites with good access and existing infrastructure in the form of internal roads. The Site is easily accessible by the M7, M9 and the regional and local road network. A detailed study of the turbine delivery route has been carried out for the Proposed Development and is contained in Volume 3 of this EIAR. Existing internal site access tracks have been used where possible, however; some new site access tracks have been added.

**Environmental Considerations:** Several years of bird surveys and ecological site walkovers were undertaken from 2017-2018 by Fehily Timoney and from 2021-2022 by SLR in the vicinity of and within the confines of the Site. The proposed site layout avoids direct impacts on designated archaeological sites and contains no peat across the site.

**Population Density:** the receiving environment for the proposed development is considered low to medium density in comparison to Counties Carlow and Kildare. The Site is located in a pocket of low to medium density south of population centres such as Portlaoise, northwest of population centres such as Carlow and west of higher density commuter counties such as Kildare.

**Constructability:** Due to the proximity to the national road network and absence of peat, the site is considered feasible from a constructability point of view. Based on the above and the proximity of the site to both the permitted Pinewoods and Coolnabacky Substations (approximately 10km each from the site), the applicant arrived within the environs of the now permitted site.

## 17.3 Alternatives

### 17.3.1 Alternative Technologies

There are a number of renewable energy technologies available for use in Ireland, most notably bio energy, wind, solar PV, hydrogen, offshore wind, tidal and wave energies. However, very few of these technologies are efficient at the Site.

The wind farm selection process is discussed firstly before the cable route options are discussed, as a cable route cannot be selected until the wind farm site has been selected. Part of the Site selection process is the proximity of the proposed wind turbines to a suitable substation connection point. Once the Site location has been identified, a number of potential cable routes are analysed through a number of factors such as length, population centres and terrain before the best route is selected.

#### Bio energy

Bio energy presents an alternative to wind in assisting Ireland to meet its renewable energy targets. Bioenergy refers to the production of renewable energy from a variety of materials of biodegradable nature and is generally considered under the headings solid biomass, biogas and biofuels. However, the technical and economic challenges for the production of biofuel are high. Bio-mass is not always a reliable energy source due to its dependence on the availability of raw materials, such as crops or wood. When these resources are scarce, it can be difficult to sustainably generate energy from bio-mass. Bio-mass energy production can also be inefficient and converting it into a useful form of energy often involves burning, which generates emissions. Bio-mass energy production can also take up a lot of land, especially if crops are being grown specifically for the production of energy, which can lead to deforestation and other environmental impacts. Additionally, bio-mass energy production is often more expensive than other renewable energy sources, such as wind and solar power. For these reasons, biomass was not an alternative technology viable for the Proposed Development Site.

#### Solar Energy

The Site is located in a predominantly agricultural area, with elevations within the site ranging from 196 m to 325 m above sea level within a heavy commercial forestry presence and productive agricultural area. Solar energy production does not require elevation and



would require a southerly aspect for optimum viability. Given the terrain of the site in tandem with the existing land uses of the area, it was considered that there would not have been enough landholding suitable for solar PV production.

### Hydrogen

Hydrogen requires a large quantity of water or a large quantity of power generation source to be produced. While hydrogen can be facilitated in tandem with a wind or solar development, it requires other important considerations for viability, including infrastructure, such as pipelines to transport the hydrogen to where it is needed or local storage, such as tanks and underground storage facilities, for safely storing the hydrogen until it is needed.

### Wind

The optimum on-ground conditions for producing onshore wind energy include: Sufficient wind speeds of at least 8 m/s, Good accessibility for construction and maintenance, a favourable local terrain, such as a high ridge or hilltop, Proximity to existing transmission lines and roads; a low population; flat and open terrain to help reduce turbulence and a large land availability to accommodate large-scale projects. Nearly all of these conditions can be met across the midlands of Laois, Offaly, Kildare and Westmeath. However, wind speeds are higher in elevated terrain. Wind energy production in Ireland is very effective due to the large available wind resource and mature cost-effective technologies.

## 17.3.2 Alternative Locations

Strategic site selection to avoid intrinsic environmental sensitivity is the principal mitigation option for onshore wind energy projects. Some locations have more inherent environmental sensitivities than others and an assessment of alternative locations can avoid such locations in favour of locations which have fewer constraints and more capacity to sustainably assimilate into a project.

There is a well-established and widely used methodology for the selection of wind energy development locations used by developers. The methodology is based on a screening process and applying key sieve analysis criteria (not listed in order of importance), as follows:

- Available wind resource
- Land use context
- Electricity grid availability and capacity
- Residential amenity and community
- Environmental constraints (including natural and archaeological heritage)
- Landscape and visual capacity
- Accessibility
- Energy and land-use planning policies; and
- Other Factors.

The developer is highly experienced and is developing other wind farms at the following locations, Cloghan, Cushalin, Moanvane and Pinewoods that employ a screening process for site selection – wind speeds, proximity to grid, housing buffers.

In assessing alternative locations, the Developer has been particularly cognisant of the policies and objectives of the Laois County Development Plan 2022-2028 and their respective predecessor plans including the Strategic Environmental Assessment (SEA) prepared for the plan in accordance with Directive 2001/42/EC. SEA is a form of environmental assessment decided upon at a higher administrative level and adopted by the Planning Authority.

With respect to policy designations within the Laois CDP, it is stated that a sizeable portion of the Site is located within an area 'not open to consideration' for wind farm development. This category is used for areas which 'due to their scenic, ecological or tourism values are unable to accommodate development of this type'.

However, with regard to the suitability of the site location, it should be noted that the Site, was assessed as the most suitable location for a number of reasons. These reasons include high wind speeds, low population density and available grid capacity in the surrounding network. With respect to the receiving environment, the developer noted that there are no residential receptors within 722 metres of any proposed turbine. They also noted that after considerable assessment there would be no significant impacts in terms of matters such as visual amenities, waterbodies/watercourses, Natura 2000 sites or national monuments.

It is also important to note that the extent of the area that is 'open to consideration' is minute and thus limiting the available of alternative locations. This is demonstrated in **Plate 17-7**.

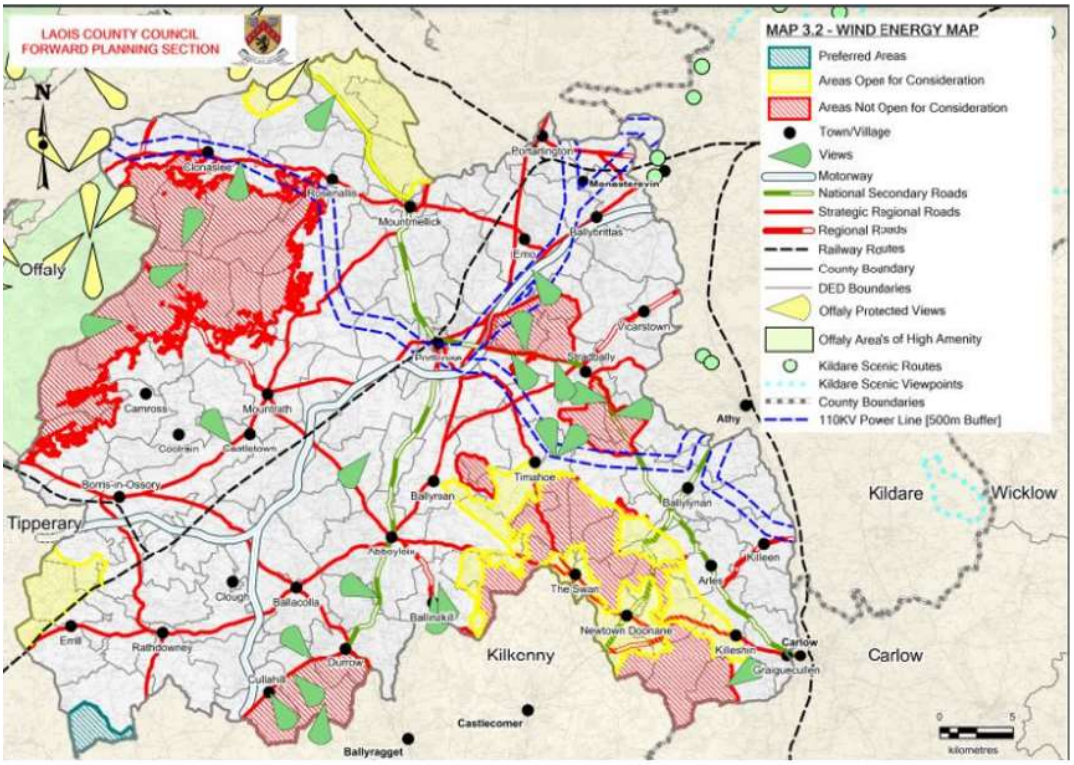



**Plate 17-7 Excerpt from Laois County Council Map 3.2 Wind Energy Map**

### 17.3.3 Alternative Design and Layouts

Following the identification of the Site as the preferred location, an iterative process was undertaken to determine the precise siting, design and layout of the proposed turbines and associated infrastructure. Several alternative layouts were evaluated to consider how

different elements of the Proposed Development could be arranged such that there would be no likely significant effects on the environment.

The aim was to adopt the combination of design and layout options that presents the best balance between the avoidance of likely significant environmental effects and the achievement of the objectives of the Project. The process involved an ongoing dialogue between technical designers and competent environmental experts throughout the design process, with the designers adjusting the design in response to continued environmental evaluation. Feedback from the scoping process, including public and stakeholder consultation discussed in Chapter 2, also informed this process.

The assessment of alternative designs and layout, which involved a series of repeated steps, each involving design and re-design, was focused on achieving the best balance with regards to a wide range of environmental factors. This continuous assessment was intrinsic to the selection of the final design and layout of the Project.

The alternative layouts considered were highly dependent on the specific turbine technology to be installed, with larger turbines requiring increased inter-turbine spacing to minimise wake effects and maintain correct operational performance. A series of wind modelling analyses, using specialist software, examined a range of site layouts and turbine designs to establish turbine technology, including hub, rotor and overall height parameters.

The site layout was designed to minimise potential environmental impacts and to maximise the wind potential on site. The design was carried out in accordance with industry guidelines and best practice, namely the Department of Environment, Heritage and Local Government (DoEHLG) Planning Guidelines (2006) / Draft Planning Guidelines (2019) and Irish Wind Energy Association Best Practice Guidelines (2012). The layout and design was an iterative process which took account of such criteria as:

- Setback to existing/permitted residential dwellings
- Set back from village and town cores, designated sites
- Landscape and visual sensitivity
- Inter-visibility/visual clutter;
- Avoidance of telecommunications links present at the general location;
- Set back from other constraints such as watercourses and power lines
- Suitable wind speeds
- Ecology and Ornithology
- Soils and Geology
- Hydrology
- Noise
- Cultural Heritage

With respect to the Proposed Development and layout, it should be noted that it progressed from a single initial layout option, through to 6 other potential proposed layouts and turbine sizes, until the final turbines, 180m tip height and 155-162m rotor diameter wind farm, within 2 no. clusters, was decided. The exact model of turbine that will be installed at the site will be the subject of a competitive procurement process prior to the construction of the wind farm which will be several years post-consent if the project is successful at the planning stage.

This was to ensure appropriate and sensitive siting of the turbines themselves and cognisance of natural and sensitive environmental constraints. The following provides a concise description of how this processed progressed.

### Initial layout at appointment

The initial layout for the site comprised a 23 no. Turbine wind farm over three clusters at Fossy Hill, Wolf Hill and an area to the south. Consideration was firstly given to the size and height of the turbines to be developed, including a project comprising of a larger number of small-to-medium sized turbines with an overall tip height of 187.5m. A number of options were considered in addition to this initial layout as shown in the following sections.

### Layout options 2 and 3

The next two layout options considered by the Client included:

- Layout Option 2: 19 no. turbine wind farm within 4 no. clusters at a tip height of 170m and rotor diameter of 136m.
- Layout Option 3: 15 no. turbine wind farm within 4 no. clusters at a tip height of 190m and rotor diameter of 164m.

The aim of these initial layouts was to gain the maximum yield from the site with the technology available at the time. However, the turbine types considered at this stage were in the process of being phased out in lieu of newer technology, which resulted in further investigation.

### Layout Options 4, 5 and 6

A number of internal investigations into potential layouts produced several more options which were provided to SLR for an initial high level assessment. The 3 no. layout options provided by the Client for consideration included:

- Layout Option 4: 18 no. turbine wind farm within 4 no. clusters at a tip height of 170m and a rotor diameter of 136m.
- Layout Option 5: 14 no. turbine wind farm within 4 no. clusters at a tip height of 190m and a rotor diameter of 164m.
- Layout Option 6: 14 no. turbine wind farm within 4 no. clusters at a tip height of 180m and a rotor diameter of 150m.

### Design Iteration 1

Following an initial landscape and visual perspective assessment undertaken between two site visits, it was considered that the 170m tip height option was not appropriate given the clustering effect on visual impact. It was considered that the slightly increased sense of visual dominance imparted is preferable to the reduced level of permeability and increased visual clutter associated with a greater number of shorter turbines required to achieve the same output. A 170m tip height involved a greater number of turbines and would have resulted in visual clutter. For these reasons the 170 m tip height was eliminated from the potential options.

This left two tip height options, a 190m tip height and a 180 m tip height. A 190m tip height would have involved fewer turbines and may have been commercially viable, however, a 190m tip height, if applied across the southern cluster would have resulted in an overbearing effect on receptors in the vicinity of The Swan. It was therefore determined

that a 180m tip height was appropriate for the scheme. This eliminated options 1, 3 and 5 and left Option 6. Further refinement of Option 6 was undertaken, which evolved into Design Iteration 1. Baseline assessment was undertaken at this stage.

### Design Iteration 1A

A number of changes were made to design iteration 1 after baseline data provided some important feedback. Notably, Turbine 6 was located adjacent to a watercourse that crossed the northern cluster and was also against some steep topography. Turbines 3 and 4 were also moved to facilitate wake buffers and to move Turbine 4 from proximity to a watercourse discovered during site visits.

### Design Iteration 2

Following careful consideration of baseline data, turbines 15 and 16 in the southernmost cluster were dropped due to a number of environmental factors:

- Historical mining in the area which would have a significant impact on turbine delivery.
- Overbearing on the surrounding residential receptors to the south.
- Visual impact from the surrounding area.
- Proximity to an Annex 1 habitat on the northern extent.

The initial design iteration 2 submitted to ABP for an SID pre-application comprised:

- A 13-turbine wind farm development within 2 no. clusters with an associated cable route.
- Each turbine has a tip height of 180m and a rotor diameter of 150m.

Preliminary Design and Environmental Assessment encompassed:

- 13 wind turbines
- Access tracks
- Turbine Delivery Route
- Internal Substation
- Internal Electricity Grid Route
- Cable route: 110 kV underground connection to a substation – the exact substation is TBD. Two cable route options are under consideration. Both options to be assessed as part of the EIAR but the cable route would not form part of the planning application due to uncertainty of capacity at the chosen substations.

Turbine 8 was also dropped from Design Iteration 1 due to unacceptable visual clutter across the landscape caused by its singular nature from the existing clusters. These changes were completed which resulted in Design Iteration 2, the wind farm design chosen for assessment and planning.

Two rounds of scoping were undertaken at this stage and into Design Iteration 2A to ascertain what potential issues, if any might be present. Round 1 was undertaken on 17th June 2022, with the Design Iteration 2 layout.

## Design Iteration 2A

Following scoping responses received from Inland Fisheries Ireland, 2RN and from Laois County Council, some minor design revisions were carried out with some micrositing of turbines. access tracks and substation / construction compounds in the northern cluster. A second round of scoping was then carried out on 17th October 2022 and concluded 5th November 2022 with no new concerns from consultees.

Three turbine types were considered at this stage, but one of these turbine types was dropped soon thereafter. The two turbine types were chosen to provide a realistic design envelope for the purposes of assessment and the dimensions of these are set out in Table 3-1 of this EIAR. An assessment of the design permutations within these dimensions was then undertaken.

With respect to the post scoping phase, an additional round of micrositing was undertaken to facilitate the bat buffer requirements for two no. turbine types. This design iteration of Coolglass has retained all infrastructure indicated in previous wind farm design and layouts alternatives. Key, non-material changes include:

- A re-design of the internal access tracks between several turbines in both clusters which minimises watercourse crossings.
- Micrositing of Turbine 2 to avoid potential impacts on public water schemes in the area
- The re-orientation of Temporary Construction Compound 1 and the Project substation, increasing separation distances to the nearest residential receptors.
- The application of Bat buffers.
- Micro siting of selected turbines to minimise the potential impact of signal scattering.

A design freeze workshop was then undertaken with the client and the assessment team, leading to the design and the current design iteration that is the subject of this EIAR.

## Alternative cable route and Substation locations

Underground electrical cables will transmit the power output from each proposed wind turbine to a proposed electricity substation onsite and onwards to the national grid connection point.

The Laois County Development Plan notes in its renewable energy policies that cable routes are to be located underground where feasible:

> *NRE 3 Ensure the provision, where feasible, of electricity cables been located underground, especially in the urban environment, and generally within areas of public open space. Where undergrounding of cables is being pursued, proposals should demonstrate that environmental impacts including the following are minimised:*
>
> - *Habitat loss as a result of removal of field boundaries and hedgerows (right of way preparation) followed by topsoil stripping (to ensure machinery does not destroy soil structure and drainage properties);*
> - *Short to medium term impacts on the landscape where, for example, hedgerows are encountered;*

- *Impacts on underground archaeology;*
- *Impacts on soil structure and drainage; and*
- *Impacts on surface waters as a result of sedimentation.*

While it is considered that overground cables are easier to repair and access and are less expensive, undergrounded cable connections will have no visual impact and will be located within the public roadway therefore eliminating impacts on underground archaeology, drainage, habitat loss and surface water considerations in compliance with Laois policy. Cable connections between the clusters will also fall within the public roadway via a 33kV collector cable.

- The selection for cable routes also included consideration of the following criteria:
- Proximity of a suitable off-site substation to connect to the national grid connection point
- Cable routes were shortened and optimised where possible to minimise impacts
- Minimisation of watercourse crossing points
- Minimisation of traffic and transportation obstruction

Two no. cable routes have been assessed as part of this EIAR- these being Option 1 and Option 2. The cable routes have been included since Design Iteration 1A given that the exact connection point is uncertain between each substation and is subject to capacity and agreement with EirGrid. Both cable routes were subject to route appraisal, desktop study and baseline surveys which considered the ecological, hydrological, geological and archaeological context of both cable routes for the purposes of this EIAR.

However, the cable route will form a separate planning application to this planning application and may be revised as required dependent upon factors such as capacity, land use change and technical requirements and will be subject to a separate EIA process.

The Laois County Development Plan, specifically on section 3.6.1 of the CDP discusses non-renewable energy and strategic projects to strengthen the electricity grid network across the midlands. In this section, it is noted that

> *EirGrid's Grid Development Strategy (2017) sets out to ensure that the transmission network has the capacity to provide for growth in electricity demand between now and 2025, with the Implementation Plan 2017 – 2022 and Transmission Development Plan 2016 directing investing to upgrading and reinforcement of the transmission network. Relevant to County Laois, the Laois-Kilkenny Reinforcement Project proposes a new 400/110kV substation situated to the south east of Portlaoise at Coolnabacky.*

Connectivity to the national grid connection point is a key part of the site location process. It was determined that both option 1 and option 2 substations were equally 10km from the final site selected and both had capacity for additional renewable energy projects. The final substation location will be subject to capacity and agreement between the Applicant and EirGrid.

## 17.4 Do Nothing Alternative

As set out in Chapter 4 of this EIAR, Ireland has binding targets set by the EU. Furthermore, the Climate Action and Low Carbon Development (Amendment) Bill (2021) will drive implementation of a suite of policies to help Ireland to achieve a 4.8% average yearly reduction in overall greenhouse gas emissions from 2021- 2025 as committed under the first carbon budget.

Under the "Do-Nothing" scenario, the Proposed Development would not go ahead, the development of wind turbines is not pursued, and the site remains in use for agriculture. In the "Do-Nothing" scenario, the prospect of creating sustainable energy through County Laois' wind energy resource would be lost at this site.

The nation's ability to produce sustainable energy and reduce greenhouse gas emissions to meet EU targets and National targets, as set out above, would be compromised. This may result in the nation incurring significant financial penalties from the EU if targets are not achieved.

For the Vestas turbine (the turbine candidate with the maximum megawatt power rating at 7.2 MW), it is estimated that, 52,325 tonnes of CO2eq per annum will be displaced for the Proposed Development. and 1,831,375 tonnes of CO2eq will be displaced over the proposed thirty five-year lifetime of the wind farm. By way of contrast, the Siemens Gamesa turbine (the turbine candidate with the minimum megawatt power rating at 6.6 MW) will displace 47,964 tonnes of CO2eq per annum or 1,678,740 tonnes CO2eq over the 35 year lifetime of the wind farm. This would otherwise be released to the atmosphere through the burning of fossil fuels in the "Do-Nothing" scenario.

This may result in continued global warming and impact upon the intention to "pursue efforts" to limit warming as agreed to in the Paris Agreement (2015). Resulting in continued negative impacts to air quality and climate.

Under the "Do-Nothing" scenario, the socio-economic benefits associated with the Proposed Development will be lost. These benefits include a potential of up to 104 to 274 jobs no. jobs during the construction phase of the Proposed Development and up to 8 to 10 long term jobs once operational. Furthermore, under the "Do-Nothing" scenario the local community will not benefit economically from the community benefit fund associated with the Project which could be used to improve physical and social infrastructure in the area.

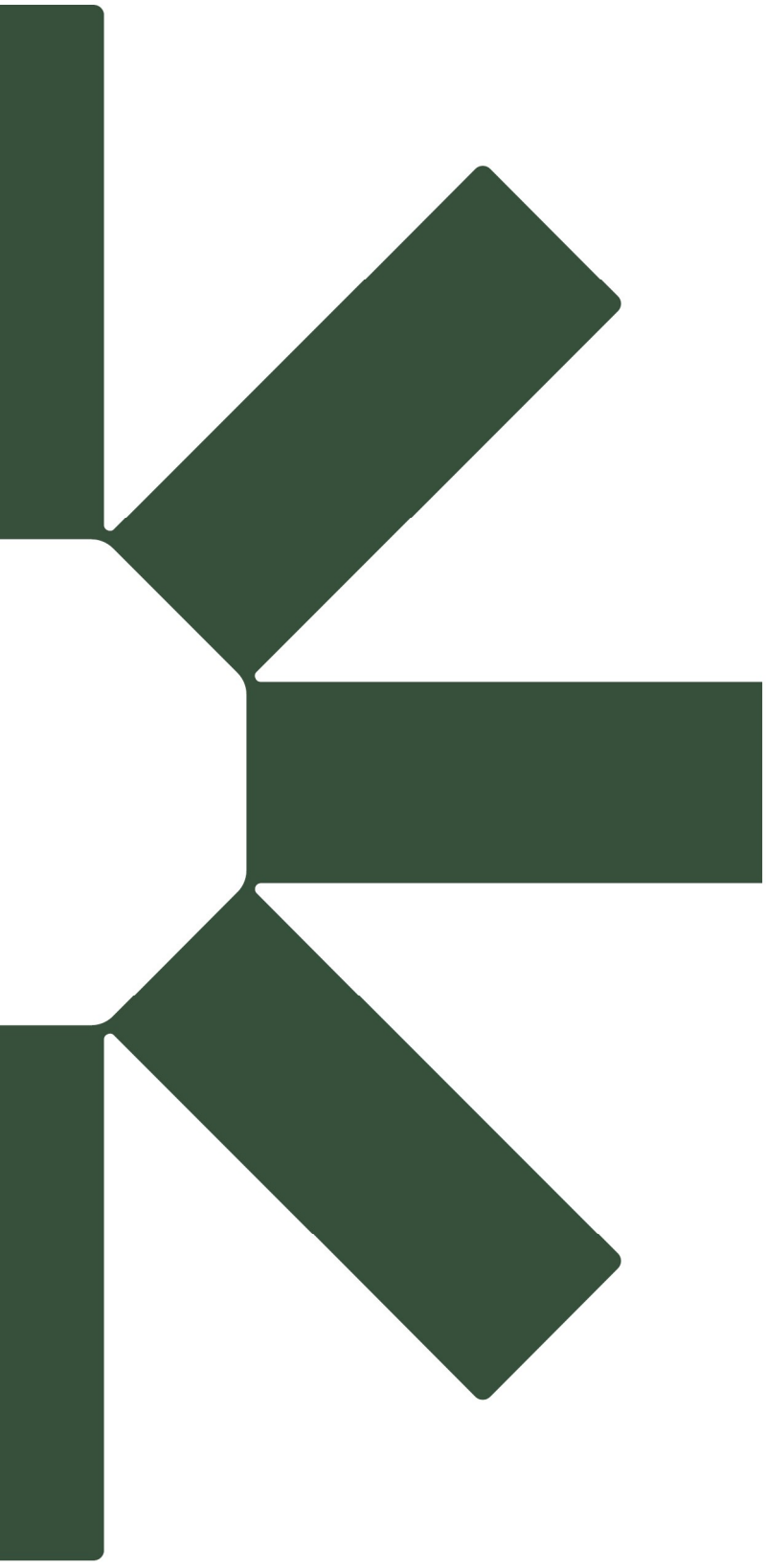
In the "Do-Nothing" scenario, the potential environmental impacts of the Proposed Development as set out throughout this EIAR will not occur. **Table 17-2** sets out the potential impacts of the 'do-nothing scenario' compared to the residual impacts associated with the Proposed Development in relation to the various environmental topics covered in the individual chapters of this EIAR. Refer to each respective chapter for full details of residual impacts.

**Table 17-2 Do Nothing Alternative**

| Environmental Consideration | Residual Impact of the Proposed Project | 'Do-nothing' Alternative |
|---|---|---|
| Air & Climate | No direct or indirect impact on air temperature, microclimate or macroclimate has been associated with the development of the Proposed Development due to the location of the site which is predominately an upland commercial forestry location with the exception of existing public roadways and internal track ways. | Fossil fuel power stations will be the primary alternative to provide the required quantities of electricity resulting in |

| Environmental Consideration | Residual Impact of the Proposed Project | 'Do-nothing' Alternative |
|---|---|---|
| | | greenhouse gas and other air pollutant emissions. |
| Noise & Vibration | With mitigation measures, the construction and decommissioning noise levels are likely to be below the relevant noise limit of 65 dB LAeq, 1hr for operations exceeding one month, and therefore construction noise impacts are not considered to be significant. No mitigation is necessary for the control of operation noise to comply with the 2006 Guidelines; therefore, the residual impacts would remain not significant. | Neutral |
| Biodiversity | Slight to imperceptible negative impact on certain species and habitat. | Neutral |
| Ornithology | Slight imperceptible reversible impact on bird species. | Neutral |
| Land, Soils, Geology | During the operational phase of the Proposed Development, there will be no new direct effects to land, soils, subsoils and bedrock due to the Proposed Development. The operational phase for the cable route will have no new direct effects on land, quaternary sediment or bedrock. | Neutral |
| Hydrology & Water Quality | Based on the available data reviewed here in relation to flooding at the site and using the precautionary approach it is considered that the risk of flooding to the Proposed Development is not subject to a significant flood risk. | Neutral |
| Population & Human Health | Through various aspects of the design process for the Coolglass Wind Farm, negative residual impact on human health is expected to be imperceptible. Long-term positive residual impacts will occur due to the provision of clean, renewable electricity. The use of upgraded forest tracks for recreational activity will provide opportunities for health gain through encouragement of exercise. | No economic benefit for the local area due to no provision of community benefit fund. |
| Material Assets | Once mitigation measures are in place and the appropriate design measures are incorporated, as proposed, there will be no significant adverse negative residual effects arising from the Project on land use.<br><br>Other infrastructure that will remain in situ includes turbine foundations and hardstands which will be covered over and vegetated. The on-site substation is likely to be taken in charge by EirGrid or ESB and the cable route will remain in situ and likely become part of the national grid. | No offset to fossil fuel use. No provision of additional electricity infrastructure in the local area. |
| Traffic & Transport | Taking account of all the potential effects that are likely to arise and the assessment having tested the worst-case scenario expected, it is considered that the Proposed Development would not lead to a significant adverse effect due to traffic impacts. | Neutral |
| Archaeology & Cultural Heritage | Taking into account all potential effects that are likely to arise and the assessment having teste the worst case scenario, its considered that the Proposed Development (wind farm, cable route, turbine delivery route and recreational amenity trail) would not lead to a significant adverse effect. | Neutral |
| Landscape & Visual | In this instance the do-nothing effect would be that the receiving landscape stays in the same or similar condition as it currently is, with the patchwork of different | Neutral |

| Environmental Consideration | Residual Impact of the Proposed Project | 'Do-nothing' Alternative |
|---|---|---|
| | vegetation types and loose network of local roads scattered with rural residences. The cycle of forestry which is currently implemented across the landscape will remain in place with the Proposed Development. | |
| Telecoms & Aviation | No significant residual effects are expected on telecommunications and broadcasting as a result of the Proposed Development. In relation to aviation, consultation with nearby airports and airfields did not identify any potential negative effects on their operations. | Neutral |



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