3. SITE SELECTION AND REASONABLE ALTERNATIVES

3.1 Introduction

Article 5(1)(d) of Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (codification) as amended by Directive 2014/52/EU (the EIA Directive) requires that the Environmental Impact Assessment Report (EIAR) prepared by the developer contains *"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 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."*

This section of the EIAR contains a description of the reasonable alternatives that were studied by the developer, which are relevant to the Proposed Development and its specific characteristics, in terms of site location and other renewable energy technologies as well as site layout incorporating size and scale of the project, connection to the national grid and transport route options to the site. This section also outlines the design considerations in relation to the renewable energy development, including the construction compound and borrow pits. It provides an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.

The consideration of alternatives is an effective means of avoiding environmental impacts. As set out in the '*Draft Guidelines on The Information to be Contained in Environmental Impact Assessment Reports' (Environmental Protection Agency, 2017),* the presentation and consideration of reasonable alternatives investigated is an important part of the overall EIA process.

Hierarchy

EIA is concerned with projects. The Environmental Protection Agency (EPA) guidelines state that in some instances neither the applicant nor the competent authority can be realistically expected to examine options that have already been previously determined by a higher authority, such as a national plan or regional programme for infrastructure.

Non-environmental Factors

EIA is confined to the environmental effects that influence consideration of alternatives. However, other non-environmental factors may have equal or overriding importance to the developer of a project, for example project economics, land availability, engineering feasibility or planning policy.

Site-specific Issues

The EPA guidelines state that the consideration of alternatives also needs to be set within the parameters of the availability of the land, i.e., the site may be the only suitable land available to the developer, or the need for the project to accommodate demands or opportunities that are site-specific. Such considerations should be on the basis of alternatives within a site, for example design and layout.

3.2 Principles of Wind Farm Site Selection

The process of identifying a suitable wind farm site is influenced by a number of factors. While wind speeds, the area of suitable or available land, and planning policy are all very important, a wind farm project must be commercially viable/competitive, as otherwise it will never attract the necessary project finance required to see it built. The grid connection, or the method by which a proposed wind farm is connected to the national grid to export electricity from the site is of critical importance. Without viable grid connection options, a wind farm cannot be built, regardless of how good the wind speeds on a site might be, how much land is available, or how favourable a planning permission may be. The distance from any potential wind farm site to the likely grid connection point, the extent and cost of grid upgrades required to facilitate the connection of the wind farm, the delay in having those reinforcement works undertaken, are all critical factors that could render a wind farm project commercially viable or unviable.

3.2.1 Strategic Site Selection

As the cost of building each megawatt of electricity-generating capacity in a wind farm is in the region of €1.5 million, it is critical that the most suitable site for the Proposed Development was chosen.

As set out in Section 1.3 of this EIAR the applicant company, Slieveacurry Ltd. is associated with Enerco Energy Ltd. which is an Irish-owned Cork-based company with extensive experience in renewable energy and is responsible for projects throughout Ireland. The group as a whole has over 640MW of renewable energy projects in operation nationally with a further 400MW in its portfolio at various stages of development/approval. All of which urgently need to be provided to assist Ireland in meeting its renewable energy targets. Enerco Energy invests a significant amount of time and resources identifying and investigating sites for renewable energy proposals throughout the Country.

Sites selected for the development of a wind farm must be suitable for consideration under a number of criteria, such as:

- Site location relative to the Clare Wind Energy Strategy's classification of areas considered suitable for wind farm development from a planning policy perspective;
- Access to the national electricity grid possible within a viable distance;
- Located outside areas designated for protection of ecological species and habitats;
- Sufficient area of unconstrained land that could potentially accommodate wind farm development and turbine spacing requirements;
- Consistently high average annual wind speeds;
- Low population density; and
- Visual Amenity.

The criteria above will be explained further below in so far as they influenced the site selection exercise undertaken.

3.2.1.1 Clare Wind Energy Strategy

The Clare Wind Energy Strategy (WES) was adopted by Clare County Council as part of the Clare County Development Plan 2017– 2023.

WES One ***Development of Renewable Energy Generation****: It is the objective of the Council to support, in principle and in appropriate scales and locations, the development of wind energy resources in County Clare. It is an objective of the Council to ensure the security of energy supply by accommodating the development of wind energy resources in appropriate areas and at appropriate scales within the County.*

WES Two ***Development of Low Carbon Economy****: County Clare will seek to promote itself as moving towards becoming a low carbon County by 2017 as a means of attracting inward investment to the County and wider Mid-West region.*

WES Three ***County Partnership Approach****: Clare County Council will seek to promote wind energy in appropriate sites in the County and will work with agencies such as the Clare County Development Board, Clare Enterprise Board, Limerick Clare Energy Agency, Shannon Development, I.D.A and Enterprise Ireland to encourage investment in research and technology associated with wind farms and other renewable energy technology.*

WES Four ***Response to National Policy****: The White Paper on Energy has set a target of 40% of electricity to be generate from renewable sources by 2020. In the Mid-West Regional Climate Change Strategy, County Clare is identified as having a potential 600MW energy produced from renewables by 2020. Clare County Council will aim to achieve a minimum target of 590 MW from wind energy by the conclusion of this Strategy.*

WES Five ***Promotion of Community Involvement****: Clare County Council will seek to promote community involvement and require community benefit where possible in Wind farm developments.*

WES SixInfrastructure Development Proposals: *Proposals for the development of infrastructure for the production, storage and distribution of electricity through the harnessing of wind energy will be considered in appropriate sites and locations, subject to relevant policy, legislation and environmental considerations.*

WES Seven ***Natura 2000 Sites:*** *Having regard to the provisions of the Habitats Directive 92/43/EEC, where a proposed development will give rise to significant adverse direct, indirect or secondary impacts on Natura 2000 sites, (either individually or in combination with other plans or projects), permission will only be granted where there is no alternative solution and where there are imperative reasons of overriding public interest in favour of granting permission, including those of a social or economic nature.*

The WES categorises the County into four classes based on development potential for wind energy for the county as a whole and presented spatially. The classification hierarchy is set out as follows.

- Strategic Areas
- Acceptable in Principle
- Open to Consideration
- Not normally permissible

WES Eight *WES Eight establishes the criteria under which strategic areas are identified and mapped. These key areas are considered to be eminently suitable for wind farm development and are of strategic importance because of;*

- Good / excellent wind resources
- Access to grid
- Distance from properties and
- Outside any Natura 2000 sites

Projects within these areas must:

- Demonstrate conformity with existing and approved wind farms to avoid visual clutter.
- Be designed and developed in line with the Wind Energy Development Guidelines, Guidelines for Planning Authorities (DoEHLG, 2006) in terms of siting, layout and environmental studies.
- Provide a Habitats Directive Assessment under Article 6 of the Habitat Regulations if the site is located in close proximity to a Special Area of Conservation or Special Protection Area.
- Be developed in a comprehensive manner avoiding the piecemeal development of the areas designated as 'strategic'.

Target wind energy generation from areas classified as strategic areas is 400MW.

WES Nine *WES Nine establishes criteria under which areas deemed acceptable in principle to wind energy development are considered. These areas are considered suitable for wind farm development because of:*

- Sufficient wind speeds,
- Access to grid network, and
- Established patterns of inquiries.

Projects within these areas must:

- Demonstrate conformity with existing and approved wind farms to avoid visual clutter.
- Designed and developed in line with the Planning Guidelines in terms of siting, layout and environmental studies.
- Provide a Habitats Directive Assessment under Article 6 of the Habitat Regulations if situated in proximity to a Special Area of Conservation or Special Protection Area.

Target wind energy generation from Target wind from `Acceptable in Principle' areas is 150 MW.

All 8 no. turbines proposed are within an area designated as 'Strategic Areas' for wind energy development by the Wind Energy Strategy as part of Clare County Development Plan 2017-2023 and is therefore, the most suitable classification for development. Please see Figure 3-1.

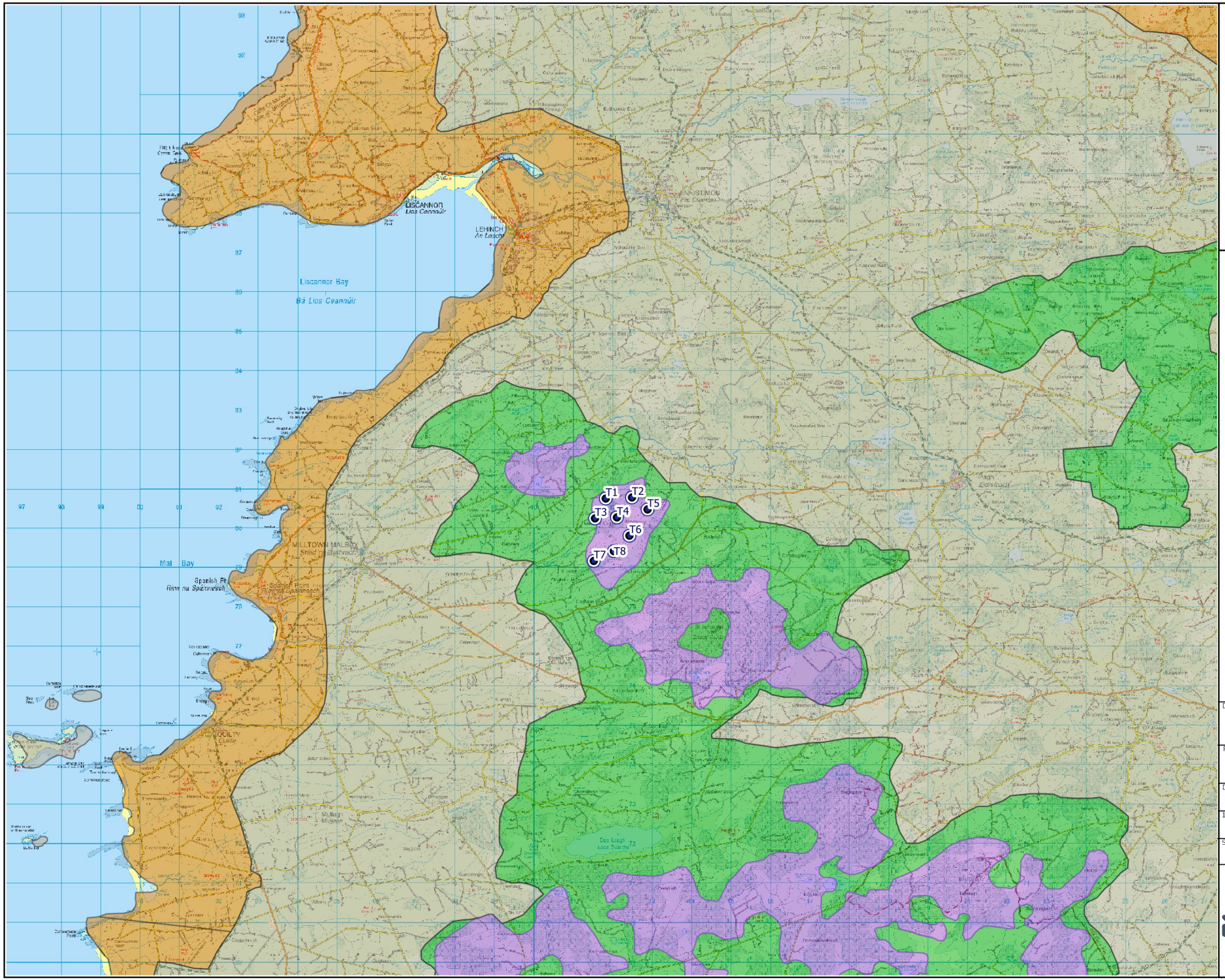
3.2.1.2 Underground Cable Connection

It is proposed to connect the Proposed Development to the national electricity grid via an underground cable which will connect the proposed turbines to the existing Slievecallan 110 kV substation, located approximately 7.1 kilometres to the southeast of the site. This connection requires an extension to Slievecallan substation and all associated works will form part of the planning application.

3.2.1.3 Designated Sites

The Proposed Development site is not located within any area designated for ecological protection. The nearest Natura 2000 site, i.e., Special Area of Conservation (SAC) or Special Protection Area (SPA) is Inagh River Estuary SAC, the boundaries of which are located approximately 6.9 kilometres to the northwest of the site, at its nearest point.

The nearest national designated site, i.e., Natural Heritage Area (NHA) or proposed Natural Heritage Area (pNHA) is Slievecallan Mountain Bog NHA, which is located approximately 2.0 kilometres to the southeast of the proposed windfarm.



Map Legend

- Proposed Turbine Locations

Co. Clare Wind Energy Strategy 2017-2023

- Strategic Areas
- Acceptable In Principle
- Open To Consideration
- Not Normally Permissable

Drawing Title
Co. Clare Wind Energy Strategy

Project Title
Slieveacurry Renewable Energy Development, Co. Clare

Drawn By	Checked By
Ellen Costello	Michael Watson
170224	Drawing No.
170224a	3-1
Scale	Date
1:125286	22.03.2021

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

3.2.1.4 Wind Speeds

The Irish Wind Atlas produced by Sustainable Energy Ireland shows average wind speeds for the country. With the upland nature of the landscape, the Wind Atlas shows that wind speeds on the Proposed Development site are consistent with a wind farm development as evidenced by the Wind Energy Strategy (WES) designation of the site as a "Strategic Area". On-site monitoring of the wind resource, which is ongoing, will further verify that with a sufficient turbine height and blade diameter, the wind resource of the site is commercially viable.

3.2.1.5 Population Density

The applicants sought to identify an area with a relatively low population density. Having reviewed the settlement patterns in the vicinity, the study area has emerged as suitable to accommodate the Proposed Development. The population density of the Study Area as described in the Population and Human Health section of this EIAR is 16.83 persons per square kilometre, as described in Chapter 5 of this EIAR. This is significantly lower than the average national population density of 70.05 persons per square kilometre.

3.2.1.6 Summary

From the review of the criteria set out above, the currently Proposed Development site was identified as a suitable location for the provision of a renewable energy development of the scale proposed. The site of the Proposed Development is located partially within an existing commercial forestry which allows the site to take advantage of existing access roads (which will be upgraded), this when combined with the proximity to the existing Slievecallan substation further highlights the suitability of the site as it can make further sustainable use of these established items of infrastructure. The proposed site is also designated as a 'Strategic Area' within the functional area of Clare County Council for the provision of wind farm development, does not overlap with any environmental designations, the Proposed Development site is accessible in terms of connection to the national grid and is also located in an area with a relatively low population density with appropriate annual wind speeds.

Once the current site emerged as a suitable location for the provision of the Proposed Development the applicants approached the landowners in order to assemble the site. Arising from the site assembly discussions the current proposed site was identified and brought forward as being capable of accommodating a cohesive viable area of sufficient size to cater for the Proposed Development. While the outcome of the site selection process has identified the site of the current proposal as a suitable location for a renewable energy development of the nature proposed, it does not preclude other sites within the vicinity being brought forward for consideration in the future.

3.3 Consideration of Alternatives

3.3.1 Methodology

The EU Guidance Document (EU, 2017) on the preparation of EIAR outlines the requirements of the EIA Directive and states that, in order to address the assessment of reasonable alternatives, the Developer needs to provide the following:

- A description of the reasonable alternatives studied; and
- An indication of the main reasons for selecting the chosen option with regards to their environmental impacts.

There is limited European and National guidance on what constitutes a 'reasonable alternative' however the EU Guidance Document (EU, 2017) states that reasonable alternatives "*must be relevant to*

the proposed project and its specific characteristics, and resources should only be spent assessing these alternatives".

The guidance also acknowledges that "*the selection of alternatives is limited in terms of feasibility. On the one hand, an alternative should not be ruled out simply because it would cause inconvenience or cost to the Developer. At the same time, if an alternative is very expensive or technically or legally difficult, it would be unreasonable to consider it to be a feasible alternative".*

The current Draft EPA Guidelines (EPA, 2017) state that "*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 is deciding on the selected option. A detailed assessment (or 'mini-EIA') of each alternative is not required."*

Consequently, taking consideration of the legislative and guidance requirements into account, this chapter addresses alternatives under the following headings:

- 'Do Nothing' Option
- Alternative Renewable Energy Technology
- Alternative Numbers and Model;
- Alternative Layouts;
- Alternative Designs;
- Alternative Transport Route and Site Access; and
- Alternative Mitigation Measures.

Each of these is addressed in the following sections.

When considering a wind farm development, given the intrinsic link between layout and design, the two will be considered together in this chapter.

3.3.2 'Do-Nothing' Option

Annex IV, Part 3 of the EIA Directive states that the description of reasonable alternatives studied by the developer should include *"an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge."* This is referred to as the "do nothing" alternative. EU guidance (EU, 2017) states that this should involve the assessment of *"an outline of what is likely to happen to the environment should the Project not be implemented – the so-called 'do-nothing' scenario."*

An alternative land-use option to developing a renewable energy project at the Proposed Development site would be to leave the site as it is, with no changes made to the current land-use practices of low intensity agriculture, turf cutting and forestry. In doing so, the environmental effects in terms of emissions are likely to be neutral however, the opportunity to capture a significant part of Clare's valuable renewable energy resource would be lost, as would the opportunity to contribute to meeting Government and EU targets for the production and consumption of electricity from renewable resources and the reduction of greenhouse gas emissions. The opportunity to generate local employment and investment would also be lost, and the local economy would continue to rely primarily on agriculture and commercial forestry as the main source of income. It is likely that the trends of population decline and rural deprivation that have been recorded within the Study Area would continue in the absence of investment, as discussed in Section 5 of this EIAR on Population and Human Health. Overall, the potential impact of this is considered to be long term, negative and slight.

The existing commercial forestry works, turf cutting and agriculture land use can and will continue in conjunction with this proposed use of the site.

3.3.3 Alternative Renewable Energy Technologies

The Proposed Development will be located on a site where forestry, agriculture and turf cutting will continue to be carried out around the footprint of the renewable energy development.

Both onshore and offshore wind energy development will be required to ensure Ireland reaches the target set in the Climate Action Plan to source 70 per cent of our electricity from renewable energy by 2030. It is not a case of 'either' 'or'. As mentioned previously, the Proposed Development is located in a 'Strategic Area' for wind energy development by the Wind Energy Strategy as part of Clare County Development Plan 2017-2023 and is therefore, a suitable location for onshore wind energy development.

An alternative source of renewable energy considered for the proposed site following its identification was solar energy. To achieve the same energy output from solar energy, the site would require a significantly larger development footprint. In addition, a solar development would have a higher potential environmental effect on Hydrology & Hydrogeology, Traffic & Transport (construction phase) and Biodiversity (habitat loss) at the site. For this reason, wind energy is considered the most suitable renewable energy option for the site.

3.3.4 Alternative Turbine Numbers and Model

The proposed wind turbines will have a potential power output in the 4 and 5 megawatt (MW) range. It is proposed to install 8 turbines at the site which could achieve approximately 33.6 MW output (mid-range capacity). Such a wind farm could also be achieved on the proposed site by using smaller turbines (for example 2.5 MW machines). However, this would necessitate the installation of over 13 turbines to achieve a similar output. Furthermore, the use of smaller turbines would not make efficient use of the wind resource available having regard to the nature of the site. A larger number of smaller turbines would result in the wind farm occupying a greater footprint within the site, with a larger amount of supporting infrastructure being required (i.e., roads etc) and increasing the potential for environmental impacts to occur. The proposed number of turbines takes account of all site constraints and the distances to be maintained between turbines and features such as roads and houses, while maximising the wind energy potential of the site. The 8 turbine layout selected for the Proposed Development has the smallest development footprint of the other alternatives considered, while still achieving the optimum output at a more consistent level than would be achievable using different turbines. The other alternatives considered included a 9 turbine layout which is discussed in further detail in Section 3.3.5 below.

The turbine model to be installed on the site will have an overall ground-to-blade tip height in the range of 175 metres maximum to 173 metres minimum; blade length in the range of 75 metres maximum and 66.5 metres minimum and hub height in the range of 108.5 metres maximum to 100 metres minimum. This EIAR provides a robust assessment of the turbines that could be considered within the overall development description. The use of alternative smaller turbines at this site would not be appropriate as they would fail to make the most efficient use of the wind resource passing over the site and would potentially require a larger development footprint. This alternative would potentially lead to additional environmental effects.

3.3.5 Alternative Turbine Layout and Design

The design of the Proposed Development has been an informed and collaborative process from the outset, involving the designers, developers, engineers, landowners, environmental, hydrological and geotechnical, archaeological specialists and traffic consultants. The aim being to reduce potential for environmental effects while designing a project capable of being constructed and viable.

Throughout the preparation of this EIAR, the layout of the Proposed Development has been revised and refined to take account of the findings of all site investigations, which have brought the design from its first initial layout to the current proposed layout. The design process has also taken account of the recommendations and comments of the relevant statutory and non-statutory organisations, the local community and local authorities as detailed in Section 2.5 of Chapter 2.

3.3.5.1 Constraints Mapping

The design and layout of the proposed wind energy development follows the recommendations and guidelines set out in the *'Wind Energy Development Guidelines'* (Department of the Environment, Heritage and Local Government, 2006) and the *'Best Practice Guidelines for the Irish Wind Energy Industry'* (Irish Wind Energy Association, 2008). The '*Wind Energy Development Guidelines for Planning Authorities'* (DoEHLG, 2006) are currently the subject of a targeted review. The proposed changes to the assessment of impacts associated with onshore wind energy developments are outlined in the document *'Proposed Revisions to Wind Energy Development Guidelines 2006 – Targeted Review'* (2013), the '*Review of the Wind Energy Development Guidelines 2006 – Preferred Draft Approach'* (June 2017), and the Draft Revised Wind Energy Development Guidelines, December 2019.

The constraints mapping process involves the placing of buffers around different types of constraints so as to clearly identify the areas within which no development works will take place. The size of the buffer zone for each constraint has been assigned using guidance presented in the Department of the Environment, Heritage and Local Government Wind Energy Guidelines (DoEHLG, 2006). As it is considered likely that that the new guidelines will be issued during the application process timeframe, current proposed changes have been incorporated into the design.

The constraints map for the site, as shown in Figure 3-2, was produced following a desk study of all site constraints. Figure 3-2 encompasses the following constraints and associated buffers:

- Residential dwellings plus a minimum 700-metre buffer (achieving the requirement for a 4 x tip height separation distance from properties in line with the new draft guidelines). There is one derelict dwelling located approximately 528m from turbine No. 2 which is owned by a landowner involved with the project. A letter of consent from this involved landowner is included in the planning pack;
- Natura 2000 sites plus 200-metre buffer;
- Telecommunication Links plus operator specific buffer;
- Watercourses plus 50-metre buffer; and
- Archaeological Sites or Monuments, 50-metre buffer, plus 'Zone of Notification' as required by the National Monuments Service (ROI).

Facilitators at the site build on the existing advantages and include the following:

- Available lands for development;
- Separation distance from un-associated landowners;
- Good wind resource;
- Existing access points and general accessibility of all areas of the site due to existing road infrastructure; and
- Limited extent of constraints.

The inclusion of the constraints on a map of the study area allows for a viable area to be identified. An initial turbine layout is then developed to take account of all the constraints mentioned above and their associated buffer zones and the separation distance required between the turbines.

Map Legend

- EIAR Site Boundary
- Proposed Turbine Locations
- Dwellings
- Dwellings Buffer (700m)
- Archaeological Sites
- Sites and Monuments Record - Zones of Notification
- Watercourse
- Watercourse Buffer (50m)
- Lakes
- Lakes Buffer (50m)
- NHA
- NHA Buffer (200m)

Drawing Title: Constraints and Facilitators

Project Title: Slieveacurry Renewable Energy Development, Co. Clare	
Drawn By: EC	Checked By: MW
Project No.: 170224	Drawing No.: Figure 3-2
Scale: 1:20000	Date: 22.03.2021

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

Following the mapping of all known constraints, detailed site investigations were carried out by the project team. The ecological assessment of the site encompassed habitat mapping and extensive surveying of birds and other fauna. This assessment, as described in Chapter 6 of this EIAR on Biodiversity, optimised the decision on the siting of turbines and the carrying out of any development works, such as the construction of roads. The hydrological and geotechnical investigations of the site examined the proposed locations for turbines, roads and other components of the Proposed Development, such as the construction compound. Where specific areas were deemed as being unsuitable for the siting of turbines or roads, etc., alternative locations were proposed and assessed, taking into account the areas that were already ruled out of consideration. The turbine layout for the Proposed Development has also been informed by wind data and the results of noise assessments as they became available.

3.3.5.2 Turbine Layout

The final proposed turbine layout takes account of all site constraints and the distances to be maintained between turbines and from houses, roads, etc. The layout is based on the results of all site investigations that have been carried out during the EIAR process. As information regarding the site of the Proposed Development was compiled and assessed, the number of turbines and the proposed layout have been revised and amended to take account of the physical constraints of the site and the requirement for buffer zones and other areas in which no turbines could be located. The selection of turbine number and layout has also had regard to wind-take, noise and shadow flicker impacts and the separation distance to be maintained between turbines. The EIAR and wind farm design process was an iterative process, where findings at each stage of the assessment were used to further refine the design, always with the intention of minimising the potential for environmental impacts.

The development of the final Proposed Development layout has resulted following feedback from the various studies and assessments carried out as well as ongoing negotiations and discussions with landowners and the local community.

There were several reviews of the specific locations of the various turbines during the optimisation of the site layout. The initial constraints study identified a significant viable area within the overall study area of the Proposed Development. The initial turbine layout comprised 11 no. turbines within a larger study area, however the proposed 8-turbine layout was refined following feedback from the project team, landowners, neighbours and the need to ensure sufficient separation distances are maintained for on-site constraints. The Proposed Development went through 9 separate iterations. All 9 turbine layout iterations have not been included, but Figure 3-3 to Figure 3-7 below gives an indication of how the design of the turbine layout evolved during the design process.

3.3.5.2.1 *Proposed Layout Iteration No. 1*

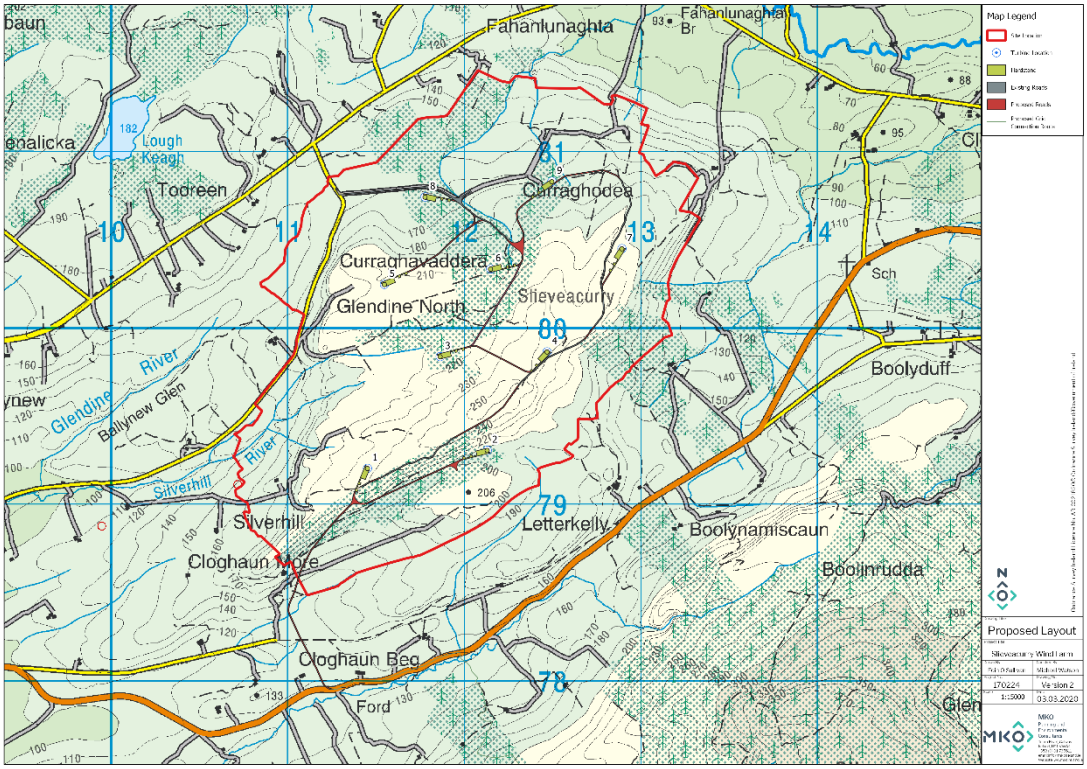


Figure 3-3: Proposed Layout Iteration No. 1

Iteration No. 1 which is presented in Figure 3-3 comprised 9 No. turbines with a number of access road options mapped. Iteration No. 1 was further refined following a desk study to include alternative road access options and other site infrastructure.

3.3.5.2.2 *Proposed Layout Iteration No. 2*

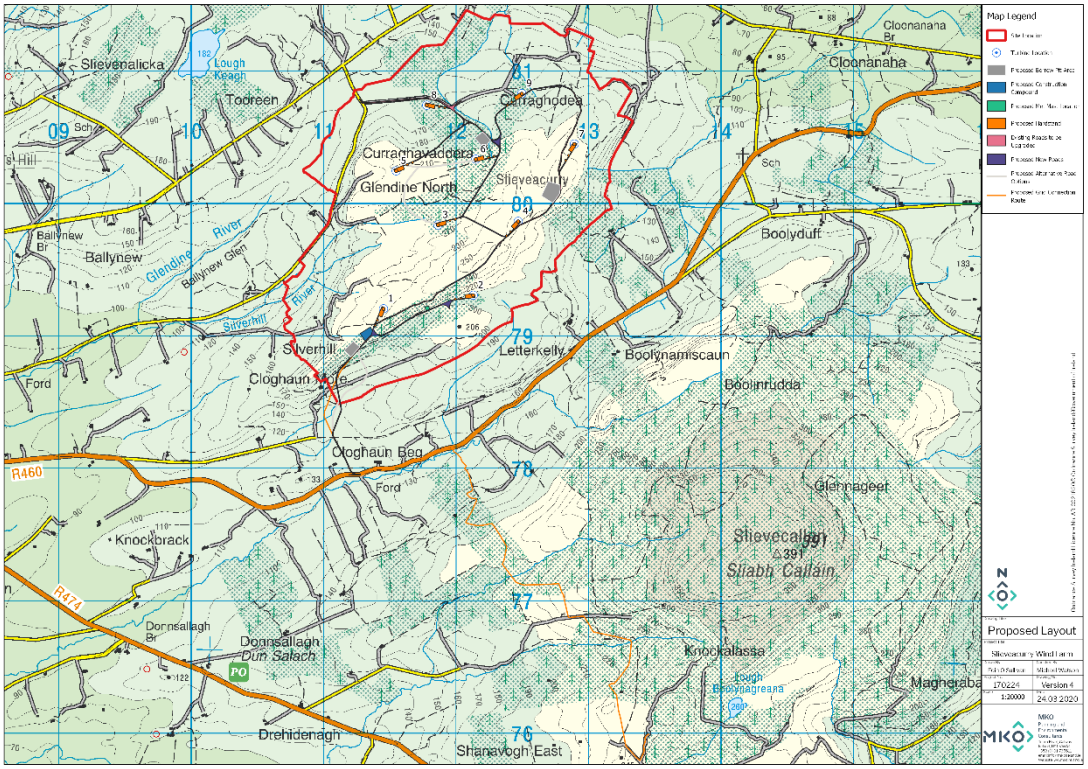


Figure 3-4: Proposed Layout Iteration No. 2

Iteration No. 2 which is presented in Figure 3-4 comprised of 9 No. turbines, a met mast, one construction compound and three borrow pit locations. Iteration No. 2 also presented a number of alternative road options for turbine access.

The layout in Iteration No. 2 was presented to the project team for detailed investigations and assessment. These investigations included habitat mapping and ecological surveying of the site and also hydrological and geotechnical investigations of the site of the Proposed Development.

3.3.5.2.3 *Proposed Layout Iteration No. 3*

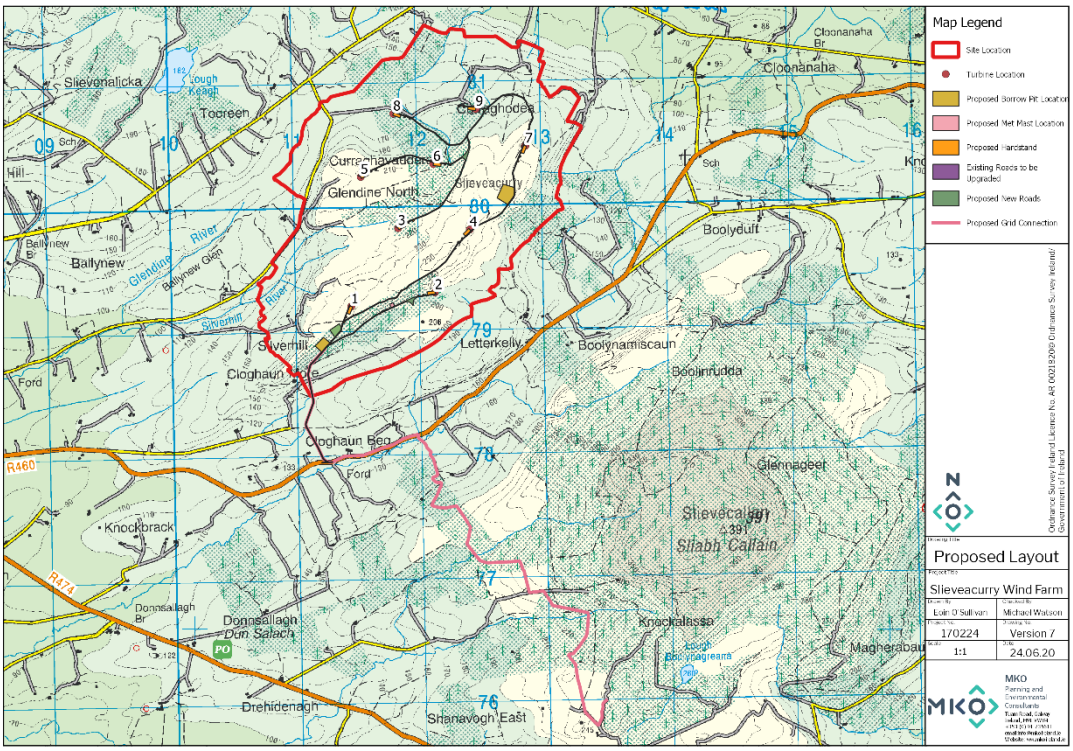


Figure 3-5: Proposed Layout Iteration No. 3

Iteration No. 3 which is presented in Figure 3-5 comprised of 9 No. turbines, a met mast, one construction compound and two borrow pit locations. As mentioned in Section 3.3.5.2.2 Iteration No. 2 was subject to detailed investigations which led to further refinement of the layout.

For Iteration No. 3 the following changes were made:

- The borrow pit to the north of turbine no. 6 was removed due to its proximity to watercourses in the area.
- Turbine No. 5 was also relocated to achieve the requirement for a 4 x tip height separation distance from the curtilage of properties in line with the new draft guidelines.
- Turbines No. 3, 6 and 8 were relocated to avoid sensitive ecological habitats.
- Change in road layout to avoid sensitive ecological habitats.

3.3.5.2.4 *Proposed Layout Iteration No. 4*

Figure 3-6: Proposed Layout Iteration No. 4

Iteration No. 4 as presented in Figure 3-6 comprised of 8 No. turbines, met mast, two construction compounds and two borrow pit locations. For this re-numbered layout, the original turbine No. 3 was dropped from the layout due to land availability. The layout was also revised to include for two temporary construction compounds. The underground cable route was also revised due to land availability.

It was also at this point that the study boundary for the purposes of the EIAR was defined. The initial site boundary was amended to focus on the final iterations of the layout.

3.3.5.2.5 *Proposed Layout Iteration No. 5*

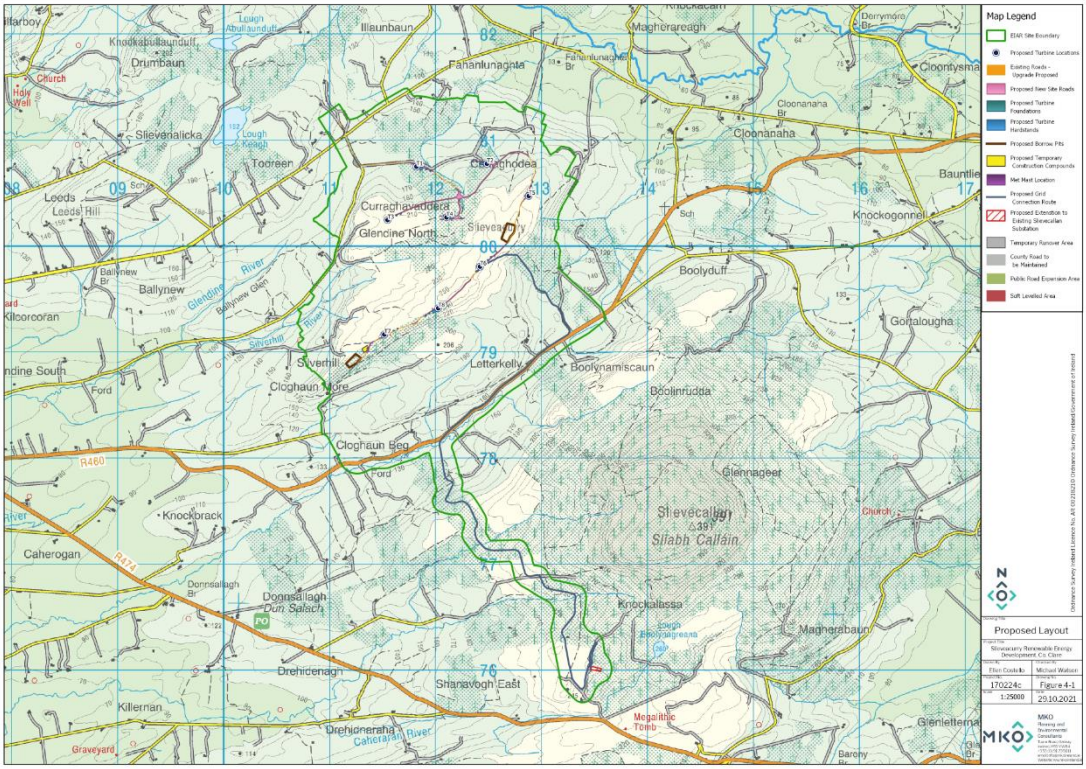


Figure 3-7: Proposed Layout Iteration No. 5

Iteration No. 5 as presented in Figure 3-7 comprised of 8 No. turbines with a maximum overall ground-to-blade tip height in the range of 175 metres maximum to 173 metres minimum; blade length in the range of 75 metres maximum and 66.5 metres minimum; hub height in the range of 108.5 metres maximum to 100 metres minimum, met mast, two construction compounds and two borrow pit locations. For this layout turbine Nos. 7 and 8 were relocated along the existing access road thereby negating the requirement to construct new access roads to turbines nos. 7 and 8. The met mast was moved to the construction compound in the southwest of the site. The underground cable route was also revised due to land availability. The revisions to the layout were found to have no greater environmental, ecological, hydrological and geotechnical effects when compared to the other options considered (Iteration No. 4).

The final proposed turbine layout as presented in Figure 3-7 takes account of all site constraints (e.g., ecology, ornithology, hydrology, peat depths etc.) and design constraints (e.g., setback distances from houses and distances between turbines on-site etc.). The layout also takes account of the results of all site investigations and baseline assessments that have been carried out during the EIAR process.

The final chosen turbine layout is considered the optimal layout given it has the least potential for environmental effects.

3.3.5.3 Road Layout

Access tracks are required onsite in order to enable transport of infrastructure and construction materials within the Proposed Development. Such tracks must be of a gradient and width sufficient to allow safe movement of equipment and vehicles. It was decided at an early stage during the design of the Proposed Development that maximum possible use would be made of existing roadways and tracks where available to minimise the potential for impacts by using new roads as an alternative.

As the overall site layout was finalised, the most suitable routes between each component of the development were identified, taking into account the existing roads and the physical constraints of the

site. Locations were identified where upgrading of the existing road would be required and where new roads are to be constructed, in order to ensure suitable access to and linkages between the various project elements, and efficient movement around the site.

An alternative option to making maximum use of the existing road network within the site would be to construct a new road network, having no regard to existing roads or tracks. This approach was not favoured, as it would require unnecessary disturbance to the site and create the potential for additional environmental impacts to occur. It would also result in an unnecessary requirement for additional cut and fill material to be used in the construction of new roads.

3.3.5.4 Location of Ancillary Structures

The ancillary structures required for the Proposed Development include construction compound/ cabling/borrow pits.

3.3.5.4.1 *Construction Compound*

The two proposed construction compounds will be used for the storage of all construction materials, turbine components, staff facilities and car-parking areas for staff and visitors. The use of two temporary construction compounds was deemed preferable to the alternative of a single large compound. Principally, it will result in shorter distances for traffic movements within the site during construction. As a result, vehicle emissions and the potential for dust arising will be reduced.

3.3.5.4.2 *Grid Connection*

The proposed renewable energy development will connect to the national grid via underground cabling, located on existing forest roads / land, agricultural land and within the public road corridor. Underground electrical cables will transmit the power output from each wind turbine to the existing Slievecallan 110 kV substation, located approximately 7.1 kilometres to the southeast of the site. Whereas overhead lines are less expensive and allow for easier repairs when required, underground lines will have no visual impact. For this reason, it was considered that underground lines would be a preferable alternative to overhead lines. The underground cables will follow insofar as possible the route of existing and proposed access tracks on existing forestry and agricultural land and public roads, thereby minimising the amount of ground disturbance required.

Two underground cable route options have been considered for the project. The layout of the proposed underground cable route has been revised and refined to take account of the findings of the site investigations and baseline assessments, which have brought the design from its initial layout as presented in Figure 3-4 to the current layout as presented in Figure 3-7.

The final underground cable route as presented in Figure 3-7 takes account of all site constraints (e.g., ecology, archaeology, hydrology, peat depths etc.) and design constraints (e.g., third party lands). The route also takes account of the findings from the site investigations and baseline assessments that have been carried out during the EIAR process.

As mentioned in Section 3.2.1.2, it is proposed to extend the existing Slievecallan 110kV substation to accommodate the connection of the proposed Slieveacurry Renewable Energy Development. An alternative to extending the existing substation would be to construct a new standalone substation adjacent to the proposed turbines. Whist this would reduce the extent of underground cabling between the turbines and the substation, any new on-site substation would also require grid connection cabling, either via underground cabling or overhead line. The proposed underground cabling connection to the existing substation is an efficient means of connecting the proposed turbines to the national grid, predominately following proposed and existing roads/ tracks. The extension to the existing substation occupies a significantly smaller footprint than that of a standalone substation. Furthermore, it is entirely

located on an existing cleared and level area. When compared to the alternative standalone option, the proposed means of connection to the national grid was deemed to represent the most efficient option.

3.3.5.4.3 *Borrow Pits*

Material required for the construction of access roads and turbine bases will be obtained from two borrow pits onsite and will be located to the southwest of Turbine No. 7 and the northeast of Turbine No. 6. The use of borrow pits represent an efficient use of existing onsite resources and eliminates the need to transport large volumes of construction materials along the local public road network to the site. The location for the borrow pits were identified taking into account the site characteristics, including topography, ground conditions, habitat type and surface water features.

An alternative to using borrow pits was the option of sourcing stone and hardcore materials from a licensed quarry in the vicinity. The movement of such material would result in a significant increase in construction traffic and heavy loads and was therefore considered the least preferable option.

3.3.5.5 Assessment

The various alternative options considered for the various project components are unlikely to have led to significant residual environmental effects however they were considered to have no significant greater environmental effects than the chosen option.

Environmental considerations have been at the core of the decision making process for all of the project components.

3.3.6 Alternative Transport Route and Site Access

Wind turbine components (blades, nacelles and towers) are not manufactured in Ireland and therefore must be imported from overseas and transported overland to the site of a Proposed Development. With regard to the selection of a transport route to the Proposed Development site, alternatives were considered in relation to turbine components, general construction-related traffic, and site access locations.

3.3.6.1 Port of Entry

The alternatives considered for the port of entry of wind turbines into Ireland for the Proposed Development include Port of Galway, Shannon Foynes Port, County Limerick and Dublin Port. Shannon Foynes Port is the principal deepwater facility on the Shannon Estuary and caters for dry bulk, break bulk, liquid and project cargoes. Port of Galway and Dublin Ports also offers a roll-on roll-off procedure to facilitate import of wind turbines. All three ports and indeed others in the state, offer potential for the importing of turbine components.

3.3.6.2 Delivery to Site

In assessing the most suitable route for turbine transport, two routes were considered:

- Option 1: Access to the Proposed Development site from the north via the M18, N85 National Secondary Road, the R460 Regional Road and the L1074 Local Road.
- Option 2: Access to the Proposed Development site from the south via the M18, N85 National Secondary Road and the R460 Regional Road.

Option 1 is the preferred turbine delivery route via the N85 from Ennis. This route would see turbine deliveries travel via Inagh along the R460 Regional Road and the L1074 Local Road to the site

entrance, accessing the site from the northwest. A review has been completed for this route in Chapter 14, Section 14.1.8, showing that it would be feasible for turbines to travel along this route.

Option 2 is also considered as an alternative route within the EIAR. This option follows the same route as Option 1, but the delivery vehicles will continue along the R460 Regional Road accessing the site from the south.

These routes have been proven suitable for the transport of turbine components, and the transport analysis (as presented in Section 14.1 of this EIAR), shows that only minor accommodation works will be required to accommodate the proposed turbines. The turbine transport route will utilise the national and primary roads available to ensure the road network holds the capacity to manage large loads. When considering turbines transport routes, alternative routes comprising of a more direct route with greater stretches of secondary and local roads were considered less optimal due to the increased possibility of road and roadside disruption and a greater need to carry out works.

All construction traffic will use the designated haul routes only. An alternative to this would be to allow for more direct access to the site using multiple approach routes; however, this is more likely to give rise to additional traffic and road impacts.

Turbines will be delivered to site using a Super Wing Carrier as detailed in Section 14.1 of this EIAR. When considering turbines transport routes, alternative modes of transport were also considered. Alternatively, depending on the selected turbine delivery route and the turbine manufacturer, a blade transporter may also be used, if deemed appropriate, for delivery of turbines to the Proposed Development site.

3.3.7 Alternative Mitigation Measures

Mitigation by avoidance has been a key aspect of the Proposed Development's evolution through the selection and design process. Avoidance of the most ecologically sensitive areas of the site limits the potential for environmental effects. As noted above, the site layout aims to avoid any environmentally sensitive areas. Where loss of habitat occurs in the site, this has been mitigated with the proposal of enhancement lands. Any forestry felled within the footprint of the site will be replaced offsite, with no net loss. The alternative to this approach is to encroach on the environmentally sensitive areas of the site and accept the potential environmental effects and risk associated with this.

The best practice design and mitigation measures set out in this EIAR will contribute to reducing any risks and have been designed to break the pathway between the site and any identified environmental receptors. The alternative is to either not propose these measures or propose measures which are not best practice and effective and neither of these options is sustainable.