3 ALTERNATIVES CONSIDERED

3.1 INTRODUCTION

This Chapter of the Environmental Impact Assessment Report (EIAR) provides 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. Alternatives were assessed taking commercial, construction, operational and key environmental constraints into consideration.

3.2 STATEMENT OF AUTHORITY

This chapter has been prepared by Ms. Shauna Conlon and reviewed by Mr. David Kiely of Jennings O'Donovan & Partners Limited.

Shauna Conlon is an Environmental Scientist with JOD who holds a First-Class Honours Degree (BSc. Hons) in Environmental Science from the Institute of Technology, Sligo. Since joining JOD, she has developed experience in a range of sectors through various projects with a current focus within the environment and renewable energy sector. Shauna's key capabilities include the preparation of Appropriate Assessments, Environmental Impact Assessments, and Geographic Information Systems.

David Kiely has undertaken EISs/ EIARs for wind farms throughout Ireland. He has 41 years' experience in the civil engineering and environmental sector and has obtained a Bachelor of Engineering Degree in Civil Engineering and a Master of Science degree in Environmental Protection. David has overseen the development of over 60 wind farms from feasibility, planning and environmental assessment through to construction, including the preparation of the consideration of alternatives chapters for other wind farms.

3.3 METHODOLOGY

3.3.1 Requirements for Alternatives Assessment

Article 5(1) of the EIA Directive (2011/92/EU) as amended requires:

"Where an environmental impact assessment is required, the developer shall prepare and submit an environmental impact assessment report. The information to be provided by the developer shall include at least: ...

(d) 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";

Annex IV of the EIA Directive as amended (Information Referred to in Article 5(1) (Information for the Environmental Impact Assessment Report) states that:
"… 2. 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 environmental effects".

The Environmental Protection Agency (2022) states 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 in deciding on the selected option".*

The EPA guidance documents on EIAR preparation[1] [2], stipulates the following:
"The presentation and consideration of the various alternatives investigated by the applicant is an important requirement of the EIA process…. and the alternatives can include:

- *alternative locations;*
- *alternative designs; and*
- *alternative processes*".

The objective is for the Developer to present 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.

In an effective EIA process, different types of alternatives may be considered at several key stages during the process. As environmental issues emerge during the preparation of the EIAR, alternative designs may need to be considered early in the process or alternative mitigation options may need to be considered towards the end of the process. These various levels of alternatives are set out in chapter.

[1] EPA. (2002). Guidelines on the information to be contained in Environmental Impact Statements.
[2] EPA. (2022). Guidelines on the information to be contained in Environmental Impact Assessment Reports.

Taking the legislative and guidance requirements into account, this chapter addresses alternatives under the following headings:

- 'Do Nothing' Option
- Strategic Site Selection
- Alternative Wind Farm Design and Layout
- Alternative Turbine Numbers and Specifications
- Alternative Transport Route and Site Access
- Alternative Grid Connection Location
- Alternative Grid Connection Routes
- Alternative Mitigation Measures

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 Approach to Alternatives

The Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report (European Union, 2017) states that reasonable alternatives *"must be relevant to the proposed project and its specific characteristics, and resources should only be spent on assessing these alternatives" and 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"*.

3.4 'DO-NOTHING' ALTERNATIVE

Annex IV, Part 3 of the EIA Directive as amended requires a *"description of the relevant aspects of the current state of the environment (baseline scenario) and 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'."

Ireland has adopted binding agreements to reduce dependency on fossil fuels and increase energy production from sustainable sources, creating a requirement for the nation to transition to a low carbon economy. The binding EU targets have been transposed into Irish

National Policy in the 2023 Climate Action Plan which focuses up to 14 GW future electricity production on the wind energy sector. This demonstrates the significance of wind energy in the Irish energy context and highlights the need for the proposed Letter Wind Farm in reaching both EU and national renewable energy targets.

Ireland is obliged to ensure that 32% of the total energy consumed in heating, electricity and transport is generated from renewable resources by 2030 and reduce its greenhouse gas emissions by at least 55% by 2030, relative to its 1990 levels, with an overall objective of carbon neutrality by 2050. This is in order to help reduce the nation's CO_2 emissions and to promote the use of indigenous renewable sources of energy. These targets have been incorporated into national policy in the Climate Action Plan (2023) which aims to:

- Reduce CO_2 eq. emissions from the electricity sector by 62-81%.
- Deliver an early and complete phase-out of coal - and peat - fired electricity generation. (Note although peat-fired electricity generation has ceased in Ireland, coal and oil-fired plants are still operational. Tarbert Power Station (620 MW) was scheduled to close by 2023, and Moneypoint Power Station (915 MW) was scheduled to close by 2025. These dates have been delayed arising from concerns about security of electricity supply. The delays mean that more carbon emissions will arise. It highlights the urgency of constructing this and other wind farms.
- Increase electricity generated from renewable sources to 80%, indicatively comprised of up to 9 GW onshore wind energy by 2030.

Furthermore, the Climate Action and Low Carbon Development (Amendment) Act (2021) will act to reduce 51% emissions over a ten-year period to 2030, in line with the programme for Government which commits to a 7% average yearly reduction in overall greenhouse gas emissions over the next decade, and to achieving net zero emissions by 2050.

Under a 'Do Nothing' alternative, the Development will not be constructed. The land upon which Development will occur would remain unchanged. The main land use of the Site would remain as commercial forestry in the northern portion and agriculture in the southern portion. Consequently, the environmental impacts, identified in the EIAR, positive and negative, would not occur. However, in the "Do-Nothing" scenario, the prospect of creating sustainable energy through County Leitrim's 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 stifled. This may result in the nation incurring significant financial penalties from the EU if targets are not achieved.

The Development has the potential to displace approximately 17,925 tonnes of CO_2 emissions per annum or 717,000 tonnes over the proposed 40-year lifetime of the wind farm, see **Chapter 10: Air and Climate** for details on the Carbon Calculator method. This would otherwise be released to the atmosphere through the burning of fossil fuels in the "Do-Nothing" scenario. This would result in continued global warming and fail to limit warming as agreed to in the Paris Agreement (2015). This will result in continued negative impacts to air quality and climate.

According to EirGrid Group's All-island Generation Capacity Statement 2021 – 2030 (EirGrid, 2021), the growth in energy demand for the next ten years on the Island of Ireland will be between 18% and 43%. In the 'Do-nothing' scenario, importation of fossil fuels to maintain growing energy supply will continue and Ireland's energy security will remain vulnerable. A "Do-nothing" scenario would contribute to strain on existing energy production and may impact on economic growth if energy demand cannot be met. The delay in closing Tarbert and Moneypoint means we continue to rely on imported fossil-fuels with unpredictable pricing, a vulnerable supply chain and higher carbon emissions.

Under the "Do-Nothing" scenario, the socio-economic benefits associated with the Development will be lost. These benefits include between 6-54 No. jobs during the construction phase of the project, and approximately 2 full time 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 improved physical and social infrastructure within the vicinity of the Project.

The potential environmental effects of the 'Do-Nothing' Alternative when compared against the chosen option of developing a renewable energy project at this Site are presented in **Table 3.1**. Refer to each respective chapter for full details of residual impacts.

Table 3.1: Environmental effects of 'Do-Nothing' compared with a wind farm development

Criteria	Residual Impact of the Project	Do-Nothing Alternative
Population & Human Health (incl. Shadow Flicker)	Positive impact on recreation and health gain due to the upgrade of roads. Long-term positive economic benefit to local area due to job creation and Community Benefit fund.	No increase in local employment and no financial gains for the local community. No potential for shadow flicker or noise to affect sensitive receptors.
Terrestrial Ecology	The Development will result in the loss and disturbance of ecological habitats. A Habitat Management Plan will be implemented to	The grassland occurring within the proposed wind farm site are intensively managed and subject to

Criteria	Residual Impact of the Project	Do-Nothing Alternative
	mitigate for the loss of habitat to the footprint of the proposed wind farm.	high levels of livestock grazing as well as nutrient application. These lands will continue to be used for intensive agricultural purposes in line with current agricultural policies for the use of productive farmlands. The conifer plantation is managed as a commercial forest. This forest will continue to be managed as a commercial forest with harvesting occurring on maturation of the stock followed by replanting. The rotation of harvesting and replanting is likely to continue to occur in these areas of commercial forestry. Artificial drainage, associated with past turbary activity will continue to direct surface water away from the proposed wind farm site with resultant water loss from remaining peatland habitats.
Aquatic Ecology	In the absence of mitigation measures the Project will have the potential to result in significant negative effects to sensitive aquatic receptors that include instream habitats, water quality and fisheries. The mitigation measures set out in this Chapter, along with the mitigations provided in **Chapter 6: Aquatic Ecology**, **Chapter 8: Soils and Geology** and **Chapter 9: Hydrology and Hydrogeology**, as well as the CEMP and the SWMP (provided as **Appendix 2.1** to this EIAR) will provide the appropriate measures to safeguard against a deterioration in water quality during the construction, operation, and decommissioning phase of the Project. Subject to the full implementation of these measures, which will be a requirement for each of the above phases of the Project, the potential for a significant risk of a deterioration in water quality, aquatic habitats and fisheries will be avoided.	In the event that the Project does not proceed, lands at and in the vicinity of the Site will continue to be used for forestry and agricultural purposes. This 'do-nothing' scenario would result in no significant change to aquatic ecology and habitats within or downstream of the Site subject to the continuation of current activities and practices. The conifer plantation is managed as a commercial forest. This forest will continue to be managed as a commercial forest with harvesting occurring on maturation of the stock followed by replanting. The rotation of harvesting and replanting is likely to continue to occur in these areas of commercial forestry. In the absence of appropriate safeguards future forestry felling will have the potential to result in the loss of pollutants such as sediment and nutrients to the Owengar River catchment.

Criteria	Residual Impact of the Project	Do-Nothing Alternative
Ornithology	Imperceptible to Moderate Impact on birds following the implementation of mitigation measures.	Without the proposed wind farm development proceeding it is expected that the current land use activities on Site will remain, namely upland grazing and forestry. The agricultural lands will continue to be used for intensive agricultural purposes in line with current agricultural policies for the use of productive farmlands. The conifer plantation is managed as a commercial forest. This forest will continue to be managed as a commercial forest with harvesting occurring on maturation of the stock followed by replanting. The rotation of harvesting and replanting is likely to continue to occur in these areas of commercial forestry. Artificial drainage, associated with past turbary activity will continue to direct surface water away from the proposed Site with resultant water loss from remaining peatland habitats.
Soils & Geology	Imperceptible residual impact following implementation of mitigation measures.	Should the proposed development not proceed, the existing land-use practices will continue with associated modification of the existing environment, including the underlying soils and geology, through upland grazing and commercial forestry.
Hydrology & Hydrogeology	Non-significant impacts following implementation of mitigation measures.	Should the proposed development not proceed, the existing land-use practice of commercial afforestation and agricultural activities will continue with associated gradual alteration of the existing environment and associated pressures on surface water and groundwater quality.
Air & Climate	Slight to moderate temporary localised residual impacts arising from fugitive dust emissions during construction. Long-term positive impact on air quality and climate due to avoidance of burning of fossil fuels	There will be no increase in air quality or a reduction of greenhouse gas emissions. By the Development not proceeding it will not assist in achieving the

Criteria	Residual Impact of the Project	Do-Nothing Alternative
	and the net displacement of approximately 17,925 tonnes of CO_2 per annum.	renewable energy targets set out in the Climate Action Plan. Fossil fuel power stations will be the primary alternative to provide the required quantities of electricity resulting in greenhouse gas and other air pollutant emissions.
Noise	Non-significant to slight temporary noise impacts associated with construction activities. Temporary moderate impact along the grid route at certain dwellings during construction. Long-term slight to moderate negative impact on the dwellings closest to the project as a result of the operational phase.	Neutral
Landscape & Visual	Aside from design iterations, which are embedded in the assessed project, other specific landscape and visual mitigation measures are not considered necessary / likely to be effective. Thus, the impacts assessed in Chapter 12, Section 12.4 and 12.5 are the equivalent of residual impacts in this instance. The proposed development will bring about a notable change in the landscape, but not necessarily a negative one, because the landscape at Letter is quite robust, and has the capacity to accept this level of change. Therefore, there is no significant impact	Neutral
Material Assets	Positive impact by offsetting use of fossil fuel. Positive impact due to provision of electricity infrastructure.	No offset to fossil fuel use. No provision of additional electricity infrastructure in the local area.
Cultural Heritage	Slight-moderate indirect visual impacts on nearby monuments. No residual impacts envisaged that cannot be reversed following decommissioning.	Neutral
Traffic and Transportation	Moderate localised short-term impact due to construction and decommissioning activities.	Neutral

3.5 STRATEGIC SITE SELECTION

3.5.1 Project Site requirements

Letter Wind Farm Ltd carried out an initial mapping exercise to identify candidate sites for wind energy development. The purpose of the site identification exercise was to identify an

area that would be capable of accommodating a wind farm development while minimising the potential for adverse impact on the environment. To satisfy this requirement, a significant landholding that would yield a sufficient viable area for the siting of each element of the Development was required.

The wind energy designations maps of the Leitrim County Development Plans 2015-2021 and 2023-2029 were used as a basis for the screening. The Developer also sought areas close to existing wind farms in the surroundings with good access to the national grid. Areas close to existing wind farms in areas classed as 'Open to Consideration' were examined using a GIS exercise applying a 600m buffer around sensitive receptors, namely, houses. The 600m buffer was derived from the Draft Revised Wind Energy Development Guidelines (Department of Housing, Local Government and Heritage, 2019) which stipulates a setback of 4 times turbine tip height being appropriate. The setback criteria was applied both to existing residences and to sites with planning permission granted by Leitrim County Council but not yet constructed. The exercise was then extended using a wide array of key spatial datasets such as ordnance survey land data, house location data, transport, forestry data, existing wind energy and grid infrastructure data and environmental data such as ecological designations and landscape designations. Having considered all of the constraints identified within the study exercise the final site selection was determined by those sites with a significant landholding capable of accommodating a feasible wind farm development while minimising the potential for adverse effects to the surrounding environment.

Study Areas not selected for further study were largely excluded because of some or all of the following:

- County Development Plan Zone
- Wind Resource
- Designated European Sites
- Tourism
- Ornithology
- Grid Risk
- Planning Precedence
- Terrain / Land Use
- Housing Density

Residential and commercial building locations were attained from Eircode's database of 2.2 million address points in Ireland. A buffer of 600m was applied to each building point, provisionally ensuring an adequate setback distance from each dwelling ensuring

compliance with the Draft 2019 Guidelines. As potential Study Area assessments progressed this dwelling setback distance was further refined to comply with project and area specific details.

In 2009, a preliminary exercise was carried out to determine the feasibility of Applicant owned lands in the townland of Boleybaun, Drumkeeran, Co. Leitrim. The lands here were originally assessed using a three-turbine layout modelling the Enercon E70 turbine (rotor diameter 71m, hub height 64m, overall ground to blade tip height 99.5m, 2.3MW rated power). The exercise determined that while the current site was suitable for a wind farm development it was not financially viable at the present time. As such, the exercise recommended additional land take and increased turbine size for the creation of an economically feasible project.

In 2021, the Applicant re-examined sites in County Leitrim, utilising the 2009 preliminary feasibility exercise as a foundation. This exercise identified potentially viable areas in the townlands of Letter, Knocknacoska, Boleybaun, Strangaun, and Leckaun. Lands in the townlands of these regions were deemed suitable due to the proximity to existing substations namely the Garvagh Glebe 110kV substation approximately <1km southwest of Letter, and the Corderry 110kV substation approximately 3km north of Letter. These regions are not located in, or close to, any European designations such as Special Protection Areas (SPA) or Special Areas of Conservation (SAC) or significant hydrological or geotechnical considerations. No other viable sites were found during the assessment. An initial layout was developed which allowed for the inclusion of 6 turbines and a redline boundary which extended from Letter in the south to Leckaun in the north (**Figure 3.2**). After a detailed preliminary constraints study the developable area was considerably reduced. The redline boundary was refined and its extent decreased, with the number of turbines decreasing from 6 to 4 (**Figure 3.3**). Further detail on the site layout can be found in **Section 3.6.2** The proposed Site now extended across the townlands of Letter, Boleybaun, and Strangaun, with an area of c. 45 hectares.

The proposed Letter Wind Farm Study Area is located approximately 2.9km west of the village of Drumkeeran, Co. Leitrim. The Site is located on elevated rolling transitional lands north of Corry Mountain (428m AOD) and northeast of Carrane Hill (458m AOD). The Letter Wind Farm Area is located in an 'Available Area' as per the Leitrim County Renewable Energy Strategy 2023-2029[3]. Accordingly, the principle of a wind farm at the Study Area is

[3] Leitrim County Development Plan 2023-2029. Appendix X Part A-Leitrim County Renewable Energy Strategy. Available at https://www.leitrimcoco.ie/eng/services_a-z/planning-and-development/development-plans/15-appendix-x-part-a-leitrim-county-renewable-energy-strategy.pdf

acceptable in planning terms, subject to other Development control considerations, including consideration of the likely significant adverse effects on the environment of the Development.

3.5.2 Preliminary Constraints Mapping and Landscape Study

Detailed constraints mapping was carried out at the preliminary stage of the project (2021) for the selected Site. The constraints mapping process involved the placing of buffers around different types of constraints so as to identify clearly the areas within which no Development works could take place. A description of the constraints and buffers applied are outlined in **Section 3.6.1**. This has resulted in a 4-turbine layout on the Site.

3.5.3 Suitability of the Candidate Site

It is critical for the Developer and their project team to ensure that the most suitable site for development of a proposed wind farm is identified and progressed through planning due to the financial commitments involved i.e., the cost of building each megawatt (MW) of electricity-generating capacity in a wind farm is in the region of €1.8 million to €2.0 million.

The site suitability has been fully informed by national, regional and local policy constraints and the location accords with these policies and objectives. (See Planning Statement accompanying this application.)

The site was further examined in the context of the following elements which are considered decisive in determining viability for a wind farm project:

- Site location relative to the Leitrim County Renewable Energy Strategy's classification of areas considered suitable for wind farm development from a planning perspective
- National grid connection capacity and access to the national grid within a viable distance
- Located outside areas designated for the protection of ecological species and habitats including European Designated Sites
- Located predominantly within an existing commercial forestry which allows the site to take advantage of existing access roads
- Wind Speeds
- Population Density

3.5.3.1 National Grid Connection

Potential grid connectivity and constraints were also considered during the strategic site selection process as detailed in the strategic screening exercise. The Site was found to be in proximity to two substations namely Garvagh Glebe 100kV substation and Corderry

110kV substation. These were assessed at a high level for connection and capacity. Corderry was selected as it had capacity and connects directly to the national transmission system. The assessment of the grid route options is described in detail in **Section 3.6.5**.

3.5.3.2 Designated Sites

It is preferable that wind energy development is not located in an area designated as a Natura 2000 site. The Project 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) to the Site is Boleybrack Mountain SAC (002032), situated 7.1km north-east of the Site at the nearest point. The nearest national designated site, i.e. Natural Heritage Area (NHA) to the Site is Corry Mountain Bog NHA (002321), situated 306m south of the Site at the nearest point. The nearest proposed Natural Heritage Area (pNHA) to the Site is Owengar Wood pNHA which is located 2.8km west from the Site at the nearest point.

3.5.3.3 Wind Speeds

Wind speed was assessed at the Site in order to determine if wind energy development would be feasible. Wind speed analysis through the Irish Wind Atlas produced by Sustainable Energy Authority of Ireland (SEAI) was used to determine average wind speeds for the country. With the upland nature of the landscape, the Wind Atlas shows that wind speeds on the Site are consistent with a wind farm development (6.4m/sec at 30m, 7.7m/sec at 75m, 8.1m/sec at 100m and 8.9m/sec at 150m).

3.5.3.4 Population Density

Areas with low housing density are preferable for wind energy development so as to minimise potential disturbance to residential amenity. Having reviewed the settlement patterns in the vicinity of the Site, the study area has emerged as suitable to accommodate the proposal. The population density of the Study Area (as described in the **Chapter 4: Population and Human Health**) is 22 persons per square kilometre[4]. This is lower than the average rural population density of 27 persons per square kilometre in rural areas[5]. The low population density of the Site provides greater capacity for wind energy development, allowing for a greater number of turbines to be constructed while maintaining appropriate setback distances from dwellings as set out in the Wind Energy Development Guidelines.

[4] https://www.cso.ie/en/census/census2016reports/census2016smallareapopulationstatistics/ [Accessed, 24/01/2023]
[5] https://www.cso.ie/en/releasesandpublications/ep/p-cp2tc/cp2pdm/pd/ [Accessed 24/01/2023]

3.5.3.5 Summary

From the review of the criteria set out above, the Site was identified as a suitable candidate site for the provision of a wind farm of the scale proposed (4 turbine layout). The Site has a mixed use as both commercial forestry and upland grazing which allows the Site to take advantage of existing access roads (which will be upgraded in specific locations). This combined with the proximity to the existing Corderry 110kV substation further highlights the suitability of the Site as it can make further sustainable use of these established items of infrastructure. The Site does not overlap with any environmental designations i.e. is not located within any Natura 2000 designated site or other nature designations and is located in an area with a relatively low population density with appropriate annual wind speeds.

3.6 WIND FARM DESIGN AND LAYOUT

The design of the Development has been informed by the designers, Developers, engineers, landowners, environmental, ecological, hydrological and geotechnical, archaeological specialists, and traffic consultants. The aim is to reduce potential for environmental effects while designing a project capable of being constructed and viable and maximising wind resource. Throughout the preparation of the EIAR, the layout of the 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, and local authorities as detailed in **Section 1.10** of **Chapter 1: Introduction**.

3.6.1 Constraints Led Approach

The design and layout of the Development follows the recommendations and industry guidelines set out in the 'Wind Energy Development Guidelines' (Department of the Environment, Heritage and Local Government, 2006), 'Best Practice Guidelines for the Irish Wind Energy Industry' (Irish Wind Energy Association, 2012) and the Draft Revised Wind Energy Development Guidelines, December 2019. The layout and design were an iterative process which followed the constraints-led design approach.

The constraints-led design approach consists of the identification of environmental sensitivities within the Site by the design team with a view to identifying suitable areas in which wind turbines may be located. The resulting area is known as the 'Developable Area'.

The constraints identification process included the gathering of information through detailed desk-based assessments, field surveys and consultation. Sensitive receptors were

mapped, and the design constraints were applied. Setback buffers were placed around different types of constraints 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) and other relevant Best Practice standards, which are identified in each chapter of this EIAR. The proposed setbacks comply with the Draft Wind Energy Guidelines 2019 requirements.

The constraints map for the Site, as shown in **Figure 3.1** encompasses the following constraints and associated buffers:

- 600m buffer of residential dwellings (4 times the tip height) (it is noted that the Development has achieved a minimum separation distance of 710m from turbines to the curtilage of properties in line with the new draft guidelines)
- 50m buffer of Watercourses
- 351m buffer of 110kV overhead line
- Setback from historic peat landslide event
- Sensitive peat and heath habitats

This demonstrates the avoidance of significant impacts on the receiving environment through mitigation by design.

The Site layout design builds on the existing site characteristics and includes the following:

- Available lands for development
- Distance from designated sites
- Good wind resource
- Existing access points and general accessibility of all areas of the Site due to existing road infrastructure
- Avoidance of environmental constraints identified from desk studies

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

Following the mapping of all known constraints, detailed site investigations were carried out by the project team. The ecological assessments of the Site encompassed habitat mapping and extensive surveying of birds and other fauna. These assessments, as described in

Chapter 5: Aquatic Ecology, **Chapter 6: Terrestrial Ecology** and **Chapter 7: Ornithology**, optimised the decision on the siting of turbines as explained in **Section 3.6.2**.

Similarly, the hydrological and geotechnical investigations of the Site informed the proposed locations for turbines, roads and other components of the Development, such as the substation and the construction compound. This included peat depth and peat stability analysis (**Chapter 8: Soils and Geology**) and the identification of watercourses, groundwater constraints, flood risk and wells (**Chapter 9: Hydrology and Hydrogeology**). Where specific areas were deemed as being unsuitable (e.g., unstable peat giving high risk for slippage) 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 wind farm has also been informed by wind data which has been collected from the SEAI Wind Mapping System[6] and the results of noise assessments as they became available.

3.6.2 Turbine Layout

The final proposed turbine layout of the Development 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 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. The requirement for buffer zones and other areas in which no turbines could be located was also compiled and assessed. The selection of turbine number and layout has 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. 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 wind farm layout has resulted following feedback from the various studies and assessments carried out as well as ongoing negotiations and discussions with landowners. There were several reviews of the specific locations of the various turbines during the optimisation of the Site layout.

The first layout allowed for the inclusion of 6 turbines in the townlands of Letter, Boleyabun, Strangaun, and Leckaun (**Figure 3.2**). The proposed turbine locations and redline boundary was refined following a detailed constraints study. Key issues identified at this stage were:

[6] SEAI (2022) Wind Mapping System. Available at https://gis.seai.ie/wind/. Accessed on 27/02/2023

- Proximity to 110kV overhead line
- Potential access issues
- Turbine dimensions

The first iteration of the Site layout, shown in **Figure 3.3**, refined both the turbine layout and redline boundary. This involved the repositioning of all turbines to achieve a 3 to 3.5 times the rotor diameter setback from the 110kV overhead line and greater separation distances between the turbines based on increased dimensions. While existing forestry roads were maintained, the Site access was changed from private forestry roads to the north, to existing access via the L4282 to the south of the Site. It was at this point that the boundary of the Site for the purposes of the EIAR was defined. The initial site boundary was amended to capture the revised turbine positions and site entrance.

A second iteration of the site layout involved the repositioning of T2 to achieve setback outside of a hydrology buffer zone and avoidance of areas where peat thickness exceeded 2.5m. Minor alterations of access tracks were also undertaken at this stage following a design team workshop (**Figure 3.4**).

The final proposed turbine layout as presented in **Figure 1.2** takes account of all Site constraints (e.g. ecology, ornithology, hydrology, peat depths etc.) and design constraints (e.g. setback distances from houses and third-party lands/infrastructure 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. A comparison of the potential environmental effects of the layout as presented in the initial, first, second and third iterations when compared against the final layout are presented in **Table 3.2**.

Table 3.2: Environmental effects from first and second layout iteration compared to the final layout

Criteria	First Layout	Second Layout	Third and Final Layout
Population & Human Health (incl. Shadow Flicker)	No material environmental difference for population or human health.	No material environmental difference for population or human health.	No material environmental difference for population or human health.

Criteria	First Layout	Second Layout	Third and Final Layout
Biodiversity	No significant environmental impacts	No significant environmental impacts	No significant environmental impacts
Ornithology	No significant environmental constraints	No significant environmental constraints	No significant environmental constraints
Soils & Geology	Slight increase in the volume of peat and spoil to be managed.	This layout was amended following initial geotechnical investigations to avoid areas of deep peat where possible and reduce the volume of peat and spoil to be managed.	Neutral
Hydrology & Hydrogeology	An increase in the volume of peat and spoil to be managed on site would increase the potential for silty runoff to enter receiving watercourses. T2 was within the 50m hydrological buffer zone.	Layout was amended following site investigations to reposition T2 to a minimum of 50m from a natural stream and avoidance of areas where the peat thickness exceeds 2.5m.	Neutral
Air & Climate	Neutral	Neutral	Neutral
Noise	Neutral	Neutral	Neutral
Material Assets	Potential for impact to existing 110kV overhead line traversing the Site.	Turbines were repositioned to avoid interference with the overhead line.	Neutral
Landscape & Visual	Neutral	Neutral	Neutral
Cultural Heritage	Neutral	Neutral	Neutral
Traffic and Transport	Neutral	Neutral	Neutral

3.6.3 Site Access Road Layout

Roads must be of a gradient and width sufficient to allow safe movement of equipment and vehicles. It was decided during the initial design of the Development existing roads would be utilised where possible to minimise the potential for impacts by constructing 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. This included where sections of new roads would need 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 utilising the existing road network within the Site would be to construct a new road network, having no regard to existing roads. This approach was considered unfavourable, 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 these new roads. A comparison of the potential environmental effects of constructing an entirely new road network when compared with maximising the use of the existing road network is presented in **Table 3.3**.

Table 3.3: Environmental effects from constructing a new Site Access Road network compared to utilising existing Site Access Roads and creating new Site Access Roads where required

Criteria	Comment
Population & Human Health (incl. Shadow Flicker)	Neutral
Biodiversity	Larger development footprint will result in greater habitat loss.
Ornithology	Larger development footprint will result in greater habitat loss which could impact birds.
Soils & Geology	Larger development footprint would result in greater volumes of peat and spoil to be excavated and stored. Larger volume of stone required from on-site borrow pit for road construction.
Hydrology & Hydrogeology	Larger development footprint and increased number of new watercourse crossings, therefore, increasing the potential for silty runoff to enter receiving watercourses.
Air & Climate	Potential for greater dust emissions due to the requirement of an increased volume of stone from the on-site borrow pit. Potential for greater vehicular emissions due to increased volume of construction traffic. However, these will not be significant.

Criteria	Comment
Noise	Neutral
Material Assets	Larger development footprint will result in greater land-take and a change in land use.
Landscape & Visual	Potential for visual and landscape impacts due to the construction of new roads. However, this will not be significant following revegetation after construction.
Cultural Heritage	Larger development footprint would increase the potential for impacts on unrecorded, subsurface archaeology.
Traffic and Transport	Neutral

3.6.4 Location of Ancillary Structures

The ancillary infrastructure required for the Development includes a temporary construction compound, electricity substation, 2 no. battery storage arrays, grid connection, and borrow pit.

3.6.4.1 Temporary Construction Compound

The Temporary Construction Compound will be used as a secure storage area for construction materials and to contain temporary Site accommodation units for sealed type staff welfare facilities. The compound will contain cabins for offices space, meeting rooms, canteen area, a drying room, parking facilities, and similar personnel type facilities. The Temporary Construction Compound is located on the south of the Site near the entrance from the local road. The use of a single Temporary Construction Compound as opposed to two smaller compounds located in different areas of the Site will result in less disturbances to the Site and a reduced visual impact. A number of locations were assessed for the location of the temporary compound. The current proposed location is considered the most suitable due to its location to the Site entrance.

A comparison of the potential environmental effects of constructing a single, large construction compound when compared against constructing two smaller compounds is presented in **Table 3.4**.

Table 3.4: Environmental effects from constructing two smaller construction compounds compared to one large construction compound.

Criteria	Comment
Population & Human Health (incl. Shadow Flicker)	Neutral
Biodiversity	Potential for a greater impact to the Site ecology by constructing two construction compounds in different areas of the Site
Ornithology	Potential for a greater impact to the Site ornithology by constructing two construction compounds in different areas of the Site.
Soils & Geology	Neutral
Hydrology & Hydrogeology	The use of multiple construction compounds sites has the potential to increase the risk of erosion and increase risk to watercourses.
Air & Climate	The use of multiple construction compounds sites has the potential to increase the number of potential dust sources on the Site.
Noise	Potential for increased noise impacts on nearby sensitive receptors.
Material Assets	Neutral
Landscape & Visual	Potential for greater visual and landscape impacts due to the construction of tracks.
Cultural Heritage	Neutral
Traffic and Transport	Less efficient movement and management of material across the Site.

3.6.4.2 Onsite Substation

In order to provide flexibility to the electrical network provider and having regard for the Site constraints the location of the Electrical Substation is restricted to the south of the Site. It should also be noted that while the operational lifespan of the proposed turbines is expected to be 40 years (following which they may be replaced or decommissioned). The electricity substation and associated infrastructure will become an ESBN asset. It will then be a permanent feature of the proposal as it will be required to continue to form part of the electrical infrastructure of the area. This will be in the event that the remainder of the Site is decommissioned. Having regard for the Site constraints and the grid connection to Corderry substation, the south of the site was selected as the most suitable location for the Onsite Substation.

3.6.5 Grid Connection Routes

A key consideration in determining the Grid Connection technology for a proposed wind energy development is whether the cabling is undergrounded or run as an overhead line. While overhead lines are less expensive and allow for easier repairs when required, underground lines will have no visual impact. A comparison of the potential environmental effects of constructing overhead lines when compared against constructing underground lines is presented in **Table 3.5**.

Table 3.5: Environmental effects from overhead lines compared to underground lines

Criteria	Comment
Population & Human Health (incl. Shadow Flicker)	Potential to impact property prices due to visual impact.
Biodiversity	Neutral
Ornithology	Neutral
Soils & Geology	Neutral
Hydrology & Hydrogeology	Neutral
Air & Climate	Neutral
Noise	Neutral
Material Assets	Neutral
Landscape & Visual	Potential for greater visual impact due to overground poles and cables.
Cultural Heritage	Neutral
Traffic and Transport	Neutral

Three grid connection route options to Corderry were assessed and considered to determine which route would be brought forward as part of the planning application. Three main options were considered:

- UGC Option 1- entirely underground exiting from the northern portion of the Site and utilising private forestry access tracks and local road with a total length of c. 4.3km.
- UGC Option 2- entirely underground exiting the southern portion of the Site and utilising public roads with a total length of c. 6.4km.
- UGC and OHL Option 3- this option follows the same route as Option 2 however, 40m of the route is comprised of overhead line and is c. 6.4km in length.

While Option 1 is the shortest of the UGC options, the beginning portion of the route (approx. 885 metres) is located within third party lands. After in depth review and consideration the Developer did not wish to rely on 3rd party consents.

Option 2 was the preferred option as the entirety of the route is comprised of UGC located within local roads and therefore utilising existing infrastructure. However, as the design of the grid connection progressed difficulties were encountered in relation to Bridge 1 (ITM 588,699E 824,092N). Due to insufficient depth here, the grid connection could not be buried. Additionally, the cables could not be attached to the bridge structure taking into consideration a scoping response received from the Department of Transport noting '*A condition requiring the developer to route cables away from bridge structures and specifically preventing the developer from attaching cables to road bridges. This would allow for the future maintenance of bridges without interruption of the electricity supply along the cables'*.

Therefore, after considering the above, the chosen option was Option 3. This route will predominantly comprise of underground grid connection with a short portion of overhead line (c. 40m) at Bridge 1.

A comparison of the potential environmental effects of constructing Option 3 compared against Options 1 and 2 are presented in **Table 3.6.**

Table 3.6: Environmental Effects from Options 1 & 2 v Option 3

Criteria	Comment
Population & Human Health (incl. Shadow Flicker)	Neutral
Terrestrial Ecology	Neutral- the route options are not located within or adjacent to a designated European Site.
Aquatic Ecology	Options 2 and 3 have more potential effects due to distance and no. of watercourse crossings
Ornithology	Neutral
Soils & Geology	It is noted that Options 2 and 3 may have more effects on soils and geology due to distance and no. of watercourse crossings.

Criteria	Comment
Hydrology & Hydrogeology	Options 2 and 3 have more potential effects due to distance and no. of watercourse crossings (7 and 7 v 3)
Air & Climate	Neutral
Noise	Neutral
Material Assets	Neutral
Landscape & Visual	While Option 3 will consist of 40m of overhead line, which involves the erection of two standard ESB Networks 20kV wooden poles, it is determined that the establishment of these poles will not be visually intrusive due to the presence of existing poles in the vicinity.
Cultural Heritage	Neutral
Traffic and Transport	Some temporary road closures will be necessary of narrow roads to facilitate the installation of cables.

3.6.5.1 Borrow Pits

Fill material required for the construction of access roads and turbine bases will be obtained from one onsite borrow pit and will be located south-west of Turbine No.2. The use of a borrow pit represents an efficient use of existing on-site resources and eliminates the need to transport large volumes of construction materials along the public road network to the Site. The location of the borrow pit was identified following detailed geotechnical site investigations and site-specific constraints outlined in **Section 3.8.1**. The borrow pit will provide up to 25,000m^3 of site won general fill. The proposed borrow pit shall also be reinstated with excavated soil material which will avoid the need to export spoil to off-site facilities.

An alternative to using onsite borrow pits was the option of sourcing all stone and hardcore materials from locally licensed quarries. The transport of such material to Site would result in a significant increase in construction traffic and heavy loads and was therefore considered the least preferable option.

A comparison of the potential environmental effects of using onsite borrow pits in comparison to using an offsite quarry is presented in **Table 3.7**.

Table 3.7: Environmental effects from utilising local quarries compared to the on-site borrow pits

Criteria	Comment
Population & Human Health (incl. Shadow Flicker)	Potential for increased noise, vehicular and dust emissions from transporting material from offsite quarry locations to the site which could have adverse health effects. Increased HGV disturbance will lead to increased environmental nuisance.
Terrestrial Ecology	Neutral
Aquatic Ecology	Neutral
Ornithology	Neutral
Soils & Geology	Effect on local quarry resource.
Hydrology & Hydrogeology	Neutral
Air & Climate	Potential increase in dust emissions and vehicle emissions associated with off-site vehicle movements.
Noise	Whilst there would be less noise generated from the Site as a result of using an offsite source, there will be an increase in noise emissions from the transport of material from offsite quarry locations on public roads. This will impact on dwellings and facilities situated along these roads.
Material Assets	Effect on local quarry resource.
Landscape & Visual	Neutral
Cultural Heritage	Neutral
Traffic and Transport	Additional HGV trips required for importation of fill.

3.7 ALTERNATIVE RENEWABLE ENERGY TECHNOLOGIES

Forestry and agriculture will continue to be carried out on the Site around the footprint of Development. The only reasonable alternative source of renewable energy considered for Site following its identification was solar energy. Commercial solar energy production is the harnessing and conversion of sunlight into electricity using photovoltaic arrays (panels). The capacity factor of solar energy is significantly lower than that of onshore wind energy, requiring approximately 3 times the capacity of the Development (c.50MW) to produce the same amount of energy. Solar farms require 1.6-2 hectares per MW, the land area required would be in the region of 27 to 34 hectares for a 16.8MW solar farm. **Table 3.8** outlines the potential impact from the development of a solar photovoltaic array when compared against

the select wind energy development. The selected wind energy development is the most efficient method of energy production with the lesser potential for significant, adverse environmental effects.

Table 3.8: Environmental effects from a solar photovoltaic array compared to a wind farm development

Criteria	Comment
Population & Human Health (incl. Shadow Flicker)	No potential for shadow flicker to affect sensitive receptors. Potential for glint and glare impacts on local road users and at dwellings.
Biodiversity	Larger development footprint would result in greater habitat loss.
Ornithology	Potential for mimicry of sensory cues i.e., glint and glare similar to water leading to bird fatalities caused by collision. This can be mitigated. No risk of collision from turbines.
Soils & Geology	Larger development footprint would result in greater volumes of peat and spoil to be excavated.
Hydrology & Hydrogeology	A solar PV array development would require a larger development footprint therefore increasing the potential for silty laden runoff to enter receiving watercourses.
Air & Climate	Reduced capacity factor of solar PV array technology would result in a longer carbon payback period.
Noise	Potential for transformers to cause noise impacts on nearby sensitive receptors.
Material Assets	The larger development footprint will would have a greater impact on the land use (Forestry and Agriculture) of the Site.
Landscape & Visual	Potentially less visible from surrounding area due to screening from existing forestry and topography. More of a visual impact due to their land take and slope of the land.
Cultural Heritage	Larger development footprint would increase the potential for impacts on unrecorded, subsurface archaeology.
Traffic & Transport	Potential for greater traffic volumes during construction phase due to the number of solar panels required to achieve the same output.

3.8 ALTERNATIVE TURBINE NUMBERS AND SPECIFICATIONS

Consideration was given to an appropriate limited range of turbine dimensions that would allow suitable flexibility at procurement stage. This is necessary because of the rate of change in technology and the length of time required to progress a project from early planning stage to turbine purchase. Different models that are currently available may not be available in a number of years' time and models that are not available now are likely to become available. The Developer undertook a review of currently available technology and chose a range of dimensions that ensures the best chance of a competitive procurement process for the proposed limited range of dimensions.

The result was the proposed limited range of dimensions as set out below:

- A tip height range of 149.85m to 150m.
- A hub height range of 91.5 to 92.
- A rotor diameter range of 115.7m to 117m.

The range of dimensions are shown on **Planning Drawing No. 5969-PL-604**.

The proposed wind turbines will have a potential power output in the 4.0 to 4.2 MW range. It is proposed to install 4 no. turbines at the Site which could achieve 16.8 MW to 17.0 MW output. A wind farm with the same potential power output could also be achieved on the Site by using smaller turbines (for example the 2.3 MW machines identified in the 2009 study as detailed in **Section 3.5.1**). However, this would necessitate the installation of up to 7 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. Taller wind turbines with larger rotor diameters allow wind turbines to sweep more area, capture more wind, and produce more electricity.

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 4 No. turbine layout selected for the Site has the smallest development footprint, while still achieving the optimum output.

The turbine model to be installed on the Site will be the subject of a competitive tendering process and will be within the following dimensions. The height of the turbines that will be selected for construction on the Site will have an overall ground to blade tip height ranging from 149.85m to 150m, a rotor diameter ranging from 115.7m to 117m and a hub height ranging from 91.5m to 92m. The use of alternative smaller turbines at this Site would fail to make the most efficient use of the wind resource passing over the Site.

Following the establishment of the developable area of the Site, as part the design alternative process, different turbine heights were considered before settling on the maximum tip height range of 149.85m to 150m as now proposed. The relationship between the turbine height and density (number of turbines) required to achieve a particular output was a key design consideration.

One such study commissioned by Fáilte Ireland in 2008 found that:
"In terms of the size and composition of wind farms, tourists tended to prefer farms containing fewer turbines. If both produced the same amount of electricity, tourists also preferred wind farms containing a small group of large turbines (55%) to a large group of smaller turbines (18%).[7]

On the basis of these factors and through design stage analysis, consideration was given to the approach that the slightly increased sense of visual dominance imparted by taller turbines is preferable to the reduced level of permeability and increased visual array associated with a greater number of shorter turbines required to achieve the same output. Moreover, the perceived visual dominance of taller turbines is further offset by increased setback distances from residential receptors.

The consideration to provide fewer, larger turbines with greater power output is in line with industry trends. This option increases energy efficiency, improving the energy output to the national grid per turbine, thus reducing the cost of energy for the consumer. The use of less turbines also reduces the impact on the receiving environment with less land-take required to accommodate the wind farm and less associated construction works as detailed above.

A comparison of the potential environmental effects of the installation of a larger number of smaller wind turbines when compared against the chosen option of installing a smaller number of larger wind turbines are presented in **Table 3.8**.

[7] Fáilte Ireland (2008). *Visitor Attitudes on the Environment-Wind farms.* Available at https://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/4_Visitor_Insights/Visitor-Attitudes-on-the-Environment.pdf?ext=.pdf. [Accessed on 12/06/2023]

Table 3.8: Environmental effects from a large number of smaller wind turbines compared to the Development

Criteria	Comment
Population & Human Health (incl. Shadow Flicker)	Greater potential for shadow flicker impact on nearby sensitive receptors.
Biodiversity	Larger development footprint would result in greater habitat loss.
Ornithology	The presence of more turbines would increase the potential effects on birds.
Soils & Geology	Larger development footprint would result in greater volumes of peat and spoil to be excavated.
Hydrology & Hydrogeology	The larger development footprint would increase the potential for silty runoff to enter receiving watercourses.
Air & Climate	Increased potential for vehicle emissions and dust emissions due to an increased volume of construction material and turbine component deliveries to the Site.
Noise	Potential for increased noise impacts on nearby sensitive receptors.
Material Assets	Neutral
Landscape & Visual	A larger number of smaller turbines would have a greater visual impact.
Cultural Heritage	Larger development footprint would increase the potential for impacts on unrecorded, subsurface archaeology.
Traffic and Transport	Potential for greater traffic volumes during construction phase due to larger development footprint and requirement for more construction materials and turbine components.

3.9 ALTERNATIVE TURBINE HAUL ROUTE

Alternative ports of entry and transport routes to the Site were considered the latter in relation to turbine component delivery and general construction-related traffic.

3.9.1 Port of Entry

Killybegs Harbour was identified as the preferred port of entry from the outset of the design considerations. This port was selected as the port of entry for this project due to its proximity to the Site and the Developer has successfully utilised this port for previous wind farm

projects. Killybegs Harbour contains the storage, handling, and logistics necessary to facilitate the import of wind turbines. This reduces the work required on the Turbine Delivery Route.

3.9.2 Turbine Component Delivery to Site

Turbine component delivery routes from Killybegs Harbour included the N56, N15, N4 and a combination of regional and local roads. This route has proven suitable for the transport of turbine components for other wind farm developments in the area. The transport analysis (as presented in **Chapter 15: Traffic and Transportation**) shows that only minor additional accommodation works will be required to accommodate the proposed turbines.

3.10 ALTERNATIVE MITIGATION MEASURES

Mitigation by avoidance has been central to the Project's evolution. By avoiding the ecologically sensitive areas of the Site the potential for environmental effects is limited. As noted above, the site layout aims to avoid any environmentally sensitive areas through the application of site-specific constraints. Where loss of habitat occurs at the Site, this has been mitigated for within the Habitat Management Plan.

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 sensitive receptors.

3.11 CONCLUSION

A description of the reasonable alternatives 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 [maximum 16.8 MW output, 4 no. turbine with a tip height range of 149.85m to 150m, a hub height range of 91.5m to 92m and a rotor diameter range of 115.7m to 117m], and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects has been provided. Through appropriate consideration of the reasonable alternatives, as outlined in this chapter, the Site has been shown to be a suitable location for the Development given consideration of the main criteria of distances from dwellings, wind speeds, potential environmental effects and use of existing available Grid Connection.