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.

This chapter is supported by Figures in **Volume III** and **Appendix 1.4**: **Glossary of Common Acronyms** in **Volume IV**.

Table 3.1: Common Acronyms

Glossary of Common Acronyms	
AOD	Above Ordnance Datum
BE	Bachelor of Engineering
BSc	Bachelor of Science
BSc (Hons)	Bachelor of Science (Honours)
C.Eng	Chartered Engineer
CAP	Climate Action Plan
CDP	County Development Plan
DoEHLG	Department of Environment, Heritage and Local Government
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
EU	European Union
Eur.Ing	European Engineer
F.ConsEI	Fellow Professional Consulting Engineer (Association of Consulting Engineers of Ireland)
FIEI	Fellow of the Institution of Engineers of Ireland
GCR	Grid Connection Route
GIS	Geographical Information Systems
km	Kilometre(s)
kV	Kilovolt
m	Metre(s)
m/s	Metres per second
MICE	Member of the Institution of Civil Engineers
MSc	Master of Science

Glossary of Common Acronyms	
MW	Megawatt
NHA	Natural Heritage Area
pNHA	Proposed Natural Heritage Area
RCONSEI	Registered Consulting Engineer
RES	Renewable Energy Strategy
SAC	Special Area of Conservation
SPA	Special Protection Area
TDR	Transport Delivery Route
UK	United Kingdom

3.2 STATEMENT OF AUTHORITY

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David Kiely is a Managing Director of JOD who holds a BE in Civil Engineering from University College Dublin and MSc in Environmental Protection from IT Sligo. He is a Fellow of Engineers Ireland, a Chartered Member of the Institution of Civil Engineers (UK) and has over 40 years' experience. He has extensive experience in the preparation of EIARs and EISs for environmental projects including Wind Farms, Solar Farms, Wastewater Projects, and various commercial developments. David has also been involved in the construction of over 60 wind farms since 1997.

3.3 METHODOLOGY

3.3.1 Requirements for Alternatives Assessment

Article 5(1) of the EIA Directive (as amended) *(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 (EIA Directive)[1] as amended by Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (2014 EIA Directive)[2])* 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".

In 2022, the Environmental Protection Agency (EPA) published the 'Guidelines on the information to be contained in Environmental Impact Assessment Reports', which 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[3] [4], stipulate the following:

[1] The European Council Directive 2011/92/EU. Available online at https://eur-lex.europa.eu/eli/dir/2011/92/oj [Accessed 17th November 2021]
[2] The European Council Directive 2014/52/EU. Available online at https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0052 [Accessed 17th November 2021]
[3] EPA. (2002). Guidelines on the information to be contained in Environmental Impact Statements.
[4] EPA. (2022). Guidelines on the information to be contained in Environmental Impact Assessment Reports.

"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:

- *a 'do-nothing' alternative (where appropriate);*
- *alternative locations;*
- *alternative layouts;*
- *alternative designs;*
- *alternative processes; and*
- *alternative mitigation measures."*

As stated in the 2022 EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports:

The objective is for the developer to present a representative range of the practicable alternatives considered. The alternatives should be described with 'an indication of the main reasons for selecting the chosen option'. It is generally sufficient to provide a broad description of each main alternative and the key issues associated with each, showing how environmental considerations were taken into account in deciding on the selected option. A detailed assessment (or 'mini-EIA') of each alternative is not required [5].

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 this chapter of the EIAR.

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

- 'Do Nothing' Alternative
- Strategic Site Selection
- Alternative Turbine Numbers and Specifications
- Alternative Layout and Design
- Alternative Transport Route and Site Access
- Alternative Grid Connection
- Alternative Renewable Energy Technologies
- Alternative Mitigation Measures

[5] Ref CJEU Case 461/17.

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 2021 Climate Action Plan (and now 2024 CAP) which focuses up to 9 GW future electricity production on the onshore wind energy sector. This demonstrates the significance of wind energy in the Irish energy context and highlights the need for the proposed Gortloughra Wind Farm in reaching both EU and national renewable energy targets.

The Climate Action Plan 2024 sets out a detailed sectoral roadmap designed to deliver a 51% reduction in greenhouse gas (GHG) emissions by 2030. The Plan aims to evaluate in detail the changes that are required in order "*to halve our emissions by 2030 and reach net zero no later than 2050, as we committed to in the Programme for Government*"; and sets

an 80% target for electricity production from renewable sources by 2030 and highlights the need to remove barriers to the development of renewables, including onshore wind.

According to EirGrid Group's All-island Generation Capacity Statement 2021 – 2030 (EirGrid, 2021)[6], 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 a 'Do Nothing' alternative, the Proposed Development will not be constructed. The land upon which the development would occur would have slight/not significant change. 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 Cork's wind energy resource would be lost at this Site.

A comparison of 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 3.2**. Refer to each respective chapter for full details of residual impacts.

Table 3.2: 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)	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 economy or community via the community benefit fund. No upgrading of local tracks or creation of new tracks which can be used for walking and mountain biking. No potential for shadow flicker or noise to affect sensitive receptors.
Biodiversity	Biodiversity enhancement	No biodiversity enhancement.

[6] All-island Generation Capacity Statement 2021 – 2030, EirGrid, 2021. Available online: https://cms.eirgrid.ie/sites/default/files/publications/208281-All-Island-Generation-Capacity-Statement-LR13A.pdf [Accessed 21/06/2024]

Criteria	Residual Impact of the Project	Do-Nothing Alternative
Ornithology	Slight Reversible Residual Effect and in the local context on birds. It will result in a Moderate Reversible Residual Effect to Kestrel and Slight Reversible Residual Effect to Red Grouse due to disturbance/displacement during the operational phase. In relation to barrier effect a Long-term Slight to Moderate effect in the local context on Kestrel and Golden Plover is predicted. However, habituation over the lifetime of the wind farm is likely to reduce these effects.	No effects on birds from the Project.
Soils & Geology	The residual impacts on the soils and geology environment as a function of the Proposed Development is that there will be a change in ground conditions at the Site with natural materials such as peat, subsoil and bedrock being replaced by concrete, subgrade and surfacing materials. This is a localised, negative, moderate significance at a local scale	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 agriculture 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	Long-term positive impact on air quality and climate due to avoidance of burning of fossil fuels and the net displacement of 37,381 tonnes of CO_2 per annum.	There will be no increase in air quality or a reduction of greenhouse gas emissions. By the Proposed Development not proceeding, it will not assist in achieving the renewable energy targets set out in the Climate Action Plan. As a result, fossil fuel power stations will be the alternative to provide the required quantities of electricity resulting in greenhouse gas and other air pollutant emissions.

Criteria	Residual Impact of the Project	Do-Nothing Alternative
Noise	Non-significant to slight temporary noise impacts associated with construction activities. Temporary moderate impact along the grid route at certain dwellings during construction. The operational noise impacts are imperceptible.	There will be no change in noise emissions.
Landscape & Visual	The scale of the Proposed Development will be well assimilated within its landscape context without undue conflicts of scale with underlying landform and land use patterns. For these reasons, the magnitude of the landscape impact is deemed to be **High-medium** within the Site and its immediate environs (c.1 km) reducing to **Medium** and then **Medium-low** for the remainder of the central Study Area. Beyond 5 km from the Site, the magnitude of landscape impact is deemed to reduce to **Low** and **Negligible** at increasing distances as the wind farm becomes a proportionately smaller and integrated component of the overall landscape fabric.	In this instance, the existing agricultural land uses, i.e. sheep grazing, within the Site would continue in the do-nothing scenario. As this aligns with the current scenario, no additional landscape or visual impacts are likely to occur.
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 renewable electricity generation infrastructure in the local area.
Cultural Heritage	No residual impacts.	There will be no potential for Cultural Heritage impacts.
Traffic and Transportation	Moderate localised short-term impact due to construction and decommissioning activities.	There will be no potential for Traffic and Transport impacts including on roads near the Site.

3.5 STRATEGIC SITE SELECTION

3.5.1 Project Site requirements

The Developer carried out an initial mapping exercise to identify suitable sites for wind farms in 2019 across the entire country. From this, four potential sites for a wind farm were identified in County Cork.

The development team undertook a detailed screening process, through Geographical Information System (GIS) software, using a number of criteria and stages to assess the potential of a large number of possible sites suitable to accommodate wind energy development. The GIS database drew upon a wide array of key spatial datasets such as forestry data, ordnance survey land data, house location data, transport, existing wind energy and grid infrastructure data and environmental data such as ecological designations, landscape designations and wind energy strategy designations available at the time.

Phase 1 – Initial Screening

This stage in the selection process discounted lands that were not available for development under a number of criteria, as follows:

1. Committed Lands for other developments
2. Farm Partnerships and Leased Lands
3. National Parks
4. Natura 2000 and Nationally Designated Sites (SAC, SPA, NHA, pNHA)

The development team also reviewed the Cork County Development Plan (CDP) and/or Renewable Energy Strategy (RES) provisions and did not proceed with further analysis where the policy context was not supportive of wind farm development. In this regard, areas were not brought forward for further analysis if they were not identified as being at least "open for consideration" for wind farm development.

Lands where the average wind speed at 80 metres above ground level was less than 7 m/s are not suitable for a commercially viable wind energy development and were also discounted at this stage.

Phase 2 – Grid Constraints

The electricity transmission system is the backbone of the nation's power system, efficiently delivering large amounts of power from where it is generated to where it is needed. As part of the site selection process, it was necessary to consider in principle the potential for grid

connection route options, including in terms of distance to potential connection nodes and the grid capacity at the nodes, in the local area, to accommodate the connection.

Phase 3 – Screening

The next stage of screening out lands from further analysis was due to the presence of the following:

1. Sensitive Amenity or Scenic Areas designation in the County Development Plan (at the time of the screening process);
2. Lands utilised for other wind farm developments;
3. Telecommunications masts and links;
4. Sensitive habitat/species of bird;
5. Land Ownership title issues;
6. Relatively high residential density in vicinity;
7. Unfavourable slopes and ground conditions.

This stage of screening was generally applied using in-house expertise and local knowledge and was subsequently validated externally in terms of the engineering considerations and the likelihood of obtaining a successful grant of planning permission based on industry trend.

Results of the Screening Process

Sites that emerged from the 2019 site selection process described above are listed below and have been brought forward as separate planning applications or not progressed:

- Gortloughra, Co. Cork (proposed);
- Carker Mountain, Co. Cork (not progressed); This location was not pursued due to slope constraints present and potential LVIA impact on the Ballyhoura mountains. This site is also located in close proximity of the Ballyhoura Mountains SAC and pNHA.
- Ballylickey, Co. Cork (not progressed); This location was not pursued due to prior pre-existing planning application submitted by Ardrah Wind Farm Limited (ref no. 11318)
- Kilworth, Co. Cork (not progressed); This location was identified as falling within the Kilworth Military Range and is protected land. Therefore, this site was not progressed.

Gortloughra was selected to be brought forward in the planning application process. The alternative to this would be to bring forward a site that did not pass the above phases of the screening process. In that instance, there would be the potential for the construction and operation of a wind energy development to have an adverse effect on ecologically designated or sensitive areas and visually sensitive (scenic) or amenity areas. There would

also be the potential for greater shadow flicker, noise and traffic impacts if the candidate site was located in an area with a higher number of residential dwellings. In addition, a site not located within practical proximity of existing grid infrastructure may not be economically viable.

The sites considered for a wind energy development presented a range of different environmental constraints and sensitivities. When compared, the proposed Gortloughra Wind Farm was found to have the greatest capacity for a wind energy development due to its robust receiving environment (including a number of existing wind farms in the area) and lack of significant environmental constraints.

The chosen Site is located 9.7 km north-west of Dunmanway, Co. Cork and 19 km south-east of the county boundary between Cork and Kerry. The Site is located on relatively high ground, at elevations ranging from 243 m AOD on the northern side of the Site at the entrance 326 m, to 510 m AOD towards the middle of the Site and 306 m AOD on the southern side of the Site. A Site Location Map showing the Redline Boundary is detailed in **Figure 1.1**. The Project boundary, which comprises of all elements of the Project is outlined as **Figure 1.2.**

The Site is located within the townlands of an tSeithe Bheag (Shehy Beg), (Muscraí Gaeltacht), Gortloughra, Cloghboola and Inchinroe.

The townlands along which the two Grid Connection options transverse include:

- **Option A (Dunmanway):** an tSeithe Bheag (Shehy Beg), Gortloughra, Inchinroe, Cloghboola, Cornery, Garraí na Tórnóra (Garryantornora), Tuairín na Lobhar (Tooreenalour), Gort na Carraige (Gortnacarriga), Moneylea, Coolcaum, Coolmountain, Tullagh, Moneyreague, Togher, Cooranig, Keelaraheen, Neaskin, Ardcahan, Knockduff, Gurteennasowna and Ballyhalwick.
- **Option B (Carrigdangan):** an tSeithe Bheag (Shehy Beg), Gortloughra, Inchinroe, Cloghboola, Cornery, Garraí na Tórnóra (Garryantornora), Tuairín na Lobhar (Tooreenalour), Gort na Carraige (Gortnacarriga), Cooragreenane, Coolroe West, Gortnahoughtee, Derryleigh, Gortatanavally, Carrigdangan and Johnstown.

Temporary works will be required to accommodate the delivery of the turbine components from the Port of Cork. These temporary works are subject to a separate planning application but are assessed as part of this EIAR and are located in the townlands of Lackanashinnagh, Shanacashel, Mallow, Glan, Curradrinagh, Seanlárach (Shanlaragh), Kilnadur, Inchincurka,

Carrigdangan, Johnstown, Commons, Derrygortnacloghy, Gortneadin, Carrignacurra, Cappanclare, Curraheen, Coolroe West, Cooragreenane, Gortaknockane, Gortnacarriga, Tooreenalour, Garraí na Tórnóra (Garryantornora), Cornery, Cloghboola, and Inchinroe.

The region is a varied and dynamic landscape that comprises a multitude of landforms and landscape features. Much of the Study Area comprises elevated rolling hills, ridges and rocky outcrops, with the Site situated along an elevated ridge that extends in a general east–west direction southwest of the summit of Shehy More.

The Study Area is located in an area designated as 'Open to Consideration' in the Cork CDP. Accordingly, the principle of a wind farm in the Study Area is acceptable in planning terms, subject to other development control considerations, including demonstration of no adverse impacts on the receiving environment. The Project's comparative advantage is demonstrated across numerous categories. Based on the analysis completed, it was deemed to present a viable opportunity from a technical, financial, and planning perspective, whilst imposing the least impact on its receiving environment.

3.5.2 Preliminary Constraints Mapping and Landscape Study

Constraints mapping was carried out at the preliminary stage of the Project (2019) for the selected site. The constraints mapping process involved the placing of buffers around different types of constraints 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 3.7.1**.

A Landscape Capacity Assessment was undertaken for an initial nine turbine layout. The Landscape Capacity Assessment used a number of visualisation tools and techniques to gauge the capacity of the Site to absorb a wind farm. This was also to determine the most appropriate spatial and vertical extent of wind turbines within each of the available lands. The findings of the assessment were used to determine the most appropriate turbine layout for the Site.

Due to the distance between the Proposed Development and existing and permitted wind farms in the area (with the exception of the adjacent Shey More Wind Farm), cumulative effects arising were not considered to be potentially significant. In conclusion, the study found that the visual impact of a nine turbine Wind Farm was acceptable with regard to the existing and permitted wind farms in the area. As outlined in **Section 3.7**, which details the evolution of the layout, it is now proposed to have eight turbines on the Site.

3.5.3 Suitability of the Candidate Site

It is critical for the Developer and their project team to see that the most suitable site for the Proposed Development is identified and progressed through planning. This is 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 **Chapter 4: Planning Policy Context**).

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

- National Grid Connection capacity;
- Designated sites;
- Wind Speeds; and
- Population Density.

3.5.3.1 National Grid Connection

The chosen Grid Connection route will be subject to a separate planning application but both Grid Connection route options have been assessed in full throughout this EIAR.

The townlands along which the two Grid Connection options transverse are outlined in **Section 3.5.1**.

It is proposed to construct a 110 kV Electrical Substation on the Site (Onsite Substation and Control Buildings), as shown on **Figure 1.2**. This will provide a connection point between the proposed wind farm and the proposed Grid Connection point at either Dunmanway or Carrigdangan 110 kV substations. Electricity transmitted between the turbines and the Onsite Substation and Control Buildings will be at 33 kV while the grid connection from the proposed wind farm to either of the substations is 110 kV.

A connection agreement will be sought from the grid system operator by a separate application to Eirgrid. TLI assessed possible connection options for the Project. The Onsite Substation and Control Buildings will connect via underground 110 kV cable to either the Dunmanway (Option A) or Carrigdangan (Option B) ESB 110 kV substations. Approximately 3.98 km of Option A is within the Site with the remainder located along the L8776 and the

R587. Approximately 3.98 km of Option B is within the Site with the remainder located along the L8776 and the L4607. The two grid connections can be summarised as follows:

- **Option A - Underground Grid Connection to Dunmanway 110kV Substation** utilising sections of UGC in public road, primarily regional roads, and private lands. [28 km]
- **Option B - Underground Grid Connection to Carrigdangan 110kV Substation** utilising sections of UGC in public road, primarily regional roads, and private lands. [22 km]

The Grid Connection routes are shown in **Figure 2.10**. The grid feasibility studies carried out by TLI can be found in **Appendix 2.2**.

3.5.3.2 Designated Sites

The Site is not located within any area designated for ecological protection. This has contributed to the site selection process of the Project. The nearest Natura 2000 site, i.e. Special Area of Conservation (SAC) or Special Protection Area (SPA) is Bandon River SAC which crosses the Grid Connection Route; the Gearagh SAC and SPA are located 6 km from the TDR and is 8 km from the Grid Connection Route Option B. The closest national site is Conigar Bog NHA (Natural Heritage Area) which is located over 5 km to the northwest.

The effects on designated sites are fully addressed in **Chapter 6: Biodiversity** and **Chapter 7: Ornithology.** They are also separately assessed in the **Natura Impact Statement** which accompanies this EIAR.

3.5.3.3 Wind Speeds

The Irish Wind Atlas produced by Sustainable Energy Authority of Ireland (SEAI) shows 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 7.7 m/s at 30 m, 8.4 m/s at 75 m, 8.6 m/s at 100 m and 8.8 m/s at 150 m).

3.5.3.4 Population Density

The Developer sought to identify an area with a relatively low population density. 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 5: Population and Human Health**) is 5 persons per square

kilometre. This is significantly lower than the average national population density of 68.1 persons per square kilometre.

3.5.3.5 Summary

From the review of the criteria set out above, the Site was identified as a suitable location for the provision of a wind farm of the scale proposed (the initial nine turbine layout which has now reduced to eight). The Site was located predominantly within agricultural land which allows the Site to take advantage of some existing access tracks (which will be upgraded) throughout the Site, this 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 and is located in an area with a relatively low population density with appropriate annual wind speeds.

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 Proposed Development was required.

The present site under consideration, and the subject of this Application, has been reduced in size. The land to the west of the Site was excluded from the Proposed Development during the design process. Therefore, there is now an eight-turbine development being taken forward rather than the 9-turbine layout initially proposed.

3.6 ALTERNATIVE TURBINE NUMBERS AND SPECIFICATIONS

At the commencement of the design phase in 2019, the layout consisted of nine turbines with a rotor diameter of 117 m across three landowners. This was then updated to a nine-turbine layout with a rotor diameter of 136 m across two landowners. This layout change occurred due to landowner constraints and upgrading the turbine type. The layout then evolved to nine turbines across two landowners but with a rotor diameter of 150 m. To address community concerns, the eastern most turbine (T6) was moved to the west (T10). The decision was then made to fully remove this turbine (T10) due to landscape concerns and buildability. This has resulted in the current eight turbine layout with a rotor diameter of 150 m.

Each of the proposed wind turbines will have a potential power output in the 6 MW range. It is proposed to install eight turbines at the Site which could achieve a 48 MW output. A

wind farm with the same potential power output could also be achieved on the Site by using smaller turbines (for example 3.5 MW machines). However, this would necessitate the installation of up to 13-14 No. 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 necessary supporting (i.e. access tracks etc.) which would increase 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 eight-turbine layout selected for the Site has the smallest development footprint, while still achieving the optimum output at a more consistent level than would be achievable using different turbines.

The turbine model to be installed on the Site will be the subject of a competitive tendering process. At construction phase, it is considered that the turbine chosen at the competitive tendering stage will comply with the turbine dimensions assessed in this EIAR. For the purposes of the EIA assessments, a Vestas V150 (6 MW) turbine has been chosen. Vestas V136 and V117 turbines were also considered during the design stages but were not considered as suitable for the Site following studies carried out by the turbine manufacturer. The maximum height of the turbines that will be selected for construction on the Site will have an overall ground to blade tip height of 175 metres.

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 3.3**.

Table 3.3: Environmental Effects of a higher number of turbines compared to eight No. Wind Turbines

Criteria	Higher number of Turbines	Eight No. Turbines
Population & Human Health (incl. Shadow Flicker)	Greater potential for shadow flicker impact on nearby sensitive receptors.	Less potential for shadow flicker impact on nearby sensitive receptors.
Biodiversity	Larger development footprint would result in greater habitat loss, particularly peatland habitat.	Less habitat loss.
Ornithology	The presence of more turbines would increase the potential collision risk for birds.	Less turbines will decrease the potential collision risk for birds.
Soils & Geology	Larger development footprint would result in greater volumes of peat and spoil to be excavated.	A smaller volume of peat and spoil will be generated.
Hydrology & Hydrogeology	The larger development footprint would increase the potential for silt laden runoff to enter receiving watercourses.	Less disturbance of soils and a decreased potential for silt laden runoff.
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.	A decreased volume of vehicles and construction materials will decrease the potential for dust and vehicle emissions.
Noise	Potential for increased noise impacts on nearby sensitive receptors.	A smaller number of turbines will provide fewer sensitive receptors. Those impacted by the larger number of turbines may not now be impacted due to their location.
Material Assets	Potential for increased impact on existing telecommunication links traversing the Site.	Less potential for impact on existing telecommunication links traversing the Site.
Landscape & Visual	A larger number of turbines would have a greater visual impact.	A smaller number of turbines will have a lesser visual impact.

Criteria	Higher number of Turbines	Eight No. Turbines
Cultural Heritage (Including architectural and archaeological aspects)	Larger development footprint would increase the potential for impacts on unrecorded, subsurface archaeology including on the archaeological setting in the landscape.	With a smaller developable area, there is a lower risk of disturbing 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.	Less construction materials are required and therefore less vehicle movements.

3.7 ALTERNATIVE LAYOUT AND DESIGN

The design of the Proposed Development has been informed by the designers, developers, engineers, landowners, environmental, hydrological and geotechnical, archaeological specialists, telecommunication specialists, and traffic consultants. The aim of this is to reduce potential for environmental effects while designing a project capable of being constructed and viable. Throughout the preparation of the 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 1.10** of **Chapter 1: Introduction, Scoping and Consultation**.

3.7.1 Constraints Led Approach

The design and layout of the Proposed 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:

- 700 m buffer of residential dwellings (adhering to the requirement for four times the tip height separation distance from the curtilage of properties in line with the new draft guidelines);
- Operator specific buffer of Telecommunication Links;
- 50 m buffer of Watercourses; and
- 100 m buffer of Archaeological Sites or Monuments.

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;
- Separation distance from landowners not involved in the Project;
- Distance from designated sites;
- Good wind resource;
- Existing access points and general accessibility of all areas of the Site due to existing road and site track infrastructure; and
- 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. The ecological assessments of the Site encompassed habitat mapping and extensive

surveying of birds and other fauna. These assessments, as described in **Chapter 6: Biodiversity** and **Chapter 7: Ornithology**, optimised the decision on the siting of turbines and the carrying out of any development works, such as the construction of access tracks.

Similarly, the hydrological and geotechnical investigations of the Site informed the proposed locations for turbines, access tracks and other components of the Proposed Development, such as the the Onsite Substation and Control Buildings and the Temporary 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 access tracks, 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 which has been collected from an on-site Met Mast and the results of noise assessments as they became available.

3.7.2 Site Layout

The final layout of the Proposed 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 in addition to environmental considerations.

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 and the local community. There were several reviews of the specific locations of the various turbines during the optimisation of the Site layout.

The evolution of all iterations have been mapped as follows: Iterations 1 – 4 can be seen in **Figure 3.2**; Iterations 5 - 8 can be seen in **Figure 3.3** and Iterations 9 - 12 can be seen in **Figure 3.4**.

The initial constraints study identified a significant viable area within the overall Study Area, suitable for approximately nine turbines, shown in **Figure 3.1** occupied the viable area within the wider Study Area. However, the proposed turbine layout was refined following feedback from the project team and the Developer. The chosen turbine layout is considered optimal as the alternative, earlier iterations of the layout had the potential for greater environmental effects.

Iterations 1-4 of the turbine layout, shown in **Figure 3.2**, looked at a nine-turbine layout. It involved repositioning all turbine locations to achieve greater separation distances between turbines and residential dwellings and avoiding areas of sensitive habitat. This layout was refined four times with relatively minor movements of turbine positions and access track alignments following a design team workshop and feedback from ongoing environmental studies. There were multiple iterations of the layout design with tweaks made to access tracks routes, Turbine Hardstand orientations, Temporary Construction Compound locations, borrow pit locations, substation locations etc. There were three main iterations, and these are compared further below.

Iterations 5-8 of the turbine layout, illustrated in **Figure 3.3** involved moving the turbines, Onsite Substation and Control Buildings and Temporary Construction Compound. It also explored the layout of access tracks and Turbine Hardstands.

Iterations 9-12 of the layout suggested alternative redline boundaries, positioning of the Temporary Construction Compound and Onsite Substation and Control Buildings and alternative locations for T10. This is shown in **Figure 3.4**.

This eventually led to T10 being omitted due to landscape concerns and buildability. The final iteration of the layout is shown on **Figure 1.2**. This shows the proposed eight turbine layout.

It was also at this point that the Redline Boundary of the Site for the purposes of the EIAR was refined. The initial Redline Boundary was amended to focus on the final iteration of the layout and proposed entrance and access route. 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 first, second and third iterations when compared against the final layout are presented in **Table 3.4**.

Table 3.4: Environmental Effects from Initial, First, Second and Third Layout Iterations Compared to the Final Layout

Criteria	Initial Layout (Figure 3.1)	Iteration 1-4 (Figures 3.2)	Iteration 5-8 (Figure 3.3)	Iteration 9-12 (Figure 3.4)	Final Layout (Figure 1.2)
Population & Human Health (incl. Shadow Flicker)	No significant effects on population and settlement patterns. More turbines have the potential to impact more sensitive receptors in terms of shadow flicker.	No material environmental difference for population or human health. More turbines have the potential to impact more sensitive receptors in terms of shadow flicker.	No material environmental difference for population or human health. More turbines have the potential to impact more sensitive receptors in terms of shadow flicker.	No material environmental difference for population or human health. More turbines have the potential to impact more sensitive receptors in terms of shadow flicker.	No significant effects.
Biodiversity	Larger scheme likely to have more potential for significant environmental effects	Larger scheme likely to have more potential for significant environmental effects	Larger scheme likely to have more potential for significant environmental effects	Larger scheme likely to have more potential for significant environmental effects.	Smaller scheme likely to have less potential for significant environmental effects.
Ornithology	Higher number of turbines has the potential to cause more collision effects.	Higher number of turbines has the potential to cause more collision effects.	Higher number of turbines has the potential to cause more collision effects.	Higher number of turbines has the potential to cause more collision effects.	Smaller scheme likely to have less potential for significant environmental effects.
Soils & Geology	Slight increase in the volume of peat and spoil to be managed.	Slight increase in the volume of peat and spoil to be managed.	Slight increase in the volume of peat and spoil to be managed.	Slight increase in the volume of peat and spoil to be managed.	Smaller scheme likely to have less potential for significant environmental effects.
Hydrology & Hydrogeology	An increase in the volume of peat and spoil to be managed on site would increase the potential for silt laden runoff to	An increase in the volume of peat and spoil to be managed on site would increase the potential for silt laden runoff to enter	An increase in the volume of peat and spoil to be managed on site would increase the potential for silt laden runoff to enter	An increase in the volume of peat and spoil to be managed on site would increase the potential for silt laden runoff to enter	Smaller scheme likely to have less potential for significant environmental effects.

Criteria	Initial Layout (Figure 3.1)	Iteration 1-4 (Figures 3.2)	Iteration 5-8 (Figure 3.3)	Iteration 9-12 (Figure 3.4)	Final Layout (Figure 1.2)
	enter receiving watercourses.	receiving watercourses.	receiving watercourses.	receiving watercourses.	
Air & Climate	Maximum output of 42 MW means a lower contribution to the reduction in CO_2 emissions.	Larger turbines but less number means a maximum output of 40.5 MW which in turn means a smaller contribution to the reduction in CO_2 emissions.	Maximum output of 42 MW means a lower contribution to the reduction in CO_2 emissions.	Maximum output of 54 MW means a higher contribution to the reduction in CO_2 emissions.	Maximum output of 48 MW. Bigger contribution to reduction in CO_2 emissions than Initial Iteration and iterations 1-8. Likely less contribution to reduction in CO_2 emissions than Iteration 9-12.
Noise	Larger scheme likely to have more potential for significant environmental effects.	Larger scheme likely to have more potential for significant environmental effects.	Larger scheme likely to have more potential for significant environmental effects.	Larger scheme likely to have more potential for significant environmental effects.	Smaller scheme likely to have less potential for significant environmental effects.
Material Assets	Larger scheme likely to have more potential for significant environmental effects.	Larger scheme likely to have more potential for significant environmental effects.	Larger scheme likely to have more potential for significant environmental effects.	Larger scheme likely to have more potential for significant environmental effects.	Smaller scheme likely to have less potential for significant environmental effects.
Landscape & Visual	Larger scheme likely to have more potential for significant environmental effects.	Larger scheme likely to have more potential for significant environmental effects.	Larger scheme likely to have more potential for significant environmental effects.	Larger scheme likely to have more potential for significant environmental effects.	Removal of T10 and smaller scheme likely to have less potential for significant effects.
Cultural Heritage	Larger scheme likely to have more potential for significant environmental effects.	Larger scheme likely to have more potential for significant environmental effects.	Larger scheme likely to have more potential for significant environmental effects.	Larger scheme likely to have more potential for significant environmental effects.	Smaller scheme likely to have less potential for significant environmental effects.
Traffic and Transport	Larger scheme likely to have more potential for significant environmental effects.	Larger scheme likely to have more potential for significant environmental effects.	Larger scheme likely to have more potential for significant environmental effects.	Larger scheme likely to have more potential for significant effects. Increased HGV loads.	Smaller scheme likely to have less potential for significant environmental effects.

3.7.3 Location of Ancillary Structures

The ancillary infrastructure required for the Proposed Development include a Temporary Construction Compound and Onsite Substation and Control Buildings. A connection to the grid will be sought in a separate planning application.

3.7.3.1 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 Temporary Construction Compound will contain cabins for office space, meeting rooms, canteen area, a drying room, parking facilities, and similar personnel type facilities. The Temporary Construction Compound is located on the northwest of the Site near the entrance to the Site off the L8776. It is accessed off the existing access track that will be upgraded within the Site. 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 Construction Compound. The current proposed location is considered the most suitable due to its location to the site entrance and its location on cutover peat which will reduce the effects on more valuable peatland on other parts of the Site.

A comparison of the potential environmental effects of constructing a single, large Temporary Construction Compound when compared against constructing two smaller compounds is presented in **Table 3.5**.

Table 3.5: Environmental Effects from Constructing a Two Smaller Temporary Construction Compounds Compared to One Large Temporary 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	Potential increased amounts of peat extraction required if constructed on other part of the Site.
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 Temporary Construction Compound 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.

3.7.3.2 On-Site Substation & Control Buildings

A number of locations for the Onsite Substation and Control Buildings were assessed in order to provide flexibility to the electrical network provider and having regard for the Site constraints the location of the Onsite Substation and Control Buildings is restricted to the east of the Site. While the operational lifespan of the proposed turbines is expected to be 40 years (following which they may be replaced or decommissioned). The Onsite Substation and Control Buildings and associated infrastructure will become an ESB 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. The various locations assessed for the Onsite Substation and Control Buildings location are shown on **Figures 3.1** to **3.4**.

3.7.3.3 Grid Connection

Details of the Grid Connection Route options is included in Section 3.5.3.1.

The GCRs are provided in **Figure 2.10**. The grid feasibility studies carried out by TLI can be found in **Appendix 2.2**.

3.7.3.4 Borrow Pit

Fill material required for the construction of access tracks and Turbine Foundations will be obtained from excavations at the on-site borrow pit and also from rock imported from a local quarry (if additional rock is required). Originally, three potential locations for borrow pits were identified with the final layout having a single large borrow pit due to potential effects on habitats.

A comparison of the potential environmental effects of using an onsite borrow pit in comparison to using an offsite quarry is presented in **Table 3.6**.

Table 3.6: Environmental Effects from Utilising On-Site Borrow Pits Compared to Local Quarries

Criteria	On-Site Borrow Pit	Local Quarries
Population & Human Health (incl. Shadow Flicker)	Less nuisance to local receptors.	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.
Biodiversity	Neutral – potential for a small area of vegetation to be removed to access the borrow pit. Potential for silt or sediment laden run-off to impact surface water bodies and the aquatic ecology they support from the borrow pit. No significant impacts to ecology.	Neutral No significant impacts to ecology.

Criteria	On-Site Borrow Pit	Local Quarries
Ornithology	Neutral – no potential impact to ornithology.	Neutral – no potential impact to ornithology.
Soils & Geology	Similar and local rock type to be used within Site in the case that a borrow pit is used.	Slight negative effect on local quarry resource where stone is imported.
Hydrology & Hydrogeology	Neutral – potential for silt or sediment laden run-off to impact surface water bodies and the aquatic ecology they support from the borrow pit.	Neutral
Air & Climate	Localised dust emissions from on-site excavation works. No impact from emissions associated with transporting stone from quarries.	Potential increase in dust emissions and vehicle emissions associated with off-site vehicle movements.
Noise	Increased noise generated on site from rock breaking activities.	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	Less reliance on quarry resources.	Negative effect on local quarry resource.
Landscape & Visual	Temporary effect during construction of a borrow pit excavation on upland location. However, this will be reinstated on completion of construction	Neutral - no potential landscape and visual impact.
Cultural Heritage (including architectural and archaeological aspects)	Potential for impacts on unrecorded, subsurface archaeology.	Neutral - The potential for impacts on unrecorded, subsurface archaeology is reduced.
Traffic and Transport	Decreased vehicular movement on local roads.	Additional HGV trips required for importation of fill.

3.7.3.5 Alternative Spoil Storage Sites

Spoil material will be generated from excavations to construct the infrastructure on Site. This will be mostly in the form of subsoils and peat. This spoil will be required to be permanently stored on Site. Generally, it is preferred to store spoil as close as possible to the site from where it was excavated. However, the Site is covered in valuable habitat and therefore, a second option of taking spoil off-site for disposal has been considered as an alternative to on-site storage.

A comparison of the potential environmental effects of storing spoil on-Site in comparison to using an offsite storage is presented in **Table 3.7**.

Table 3.7: Environmental Effects from Utilising On-Site Storage Compared to Off-Site

Criteria	Comment
Population & Human Health (incl. Shadow Flicker)	Less vehicular movements and potential health benefits.
Biodiversity	Increased amount of blanket bog habitat affected. No enhancement of areas of degraded peat habitat.
Ornithology	Increased amount of habitat affected.
Soils & Geology	More likely to have slippage if stored on slopes.
Hydrology & Hydrogeology	Increased risk of sediment laden runoff to watercourses. Increased risk of peat instability.
Air & Climate	Less vehicular movements and decrease in air quality effects.
Noise	Less noise generated from vehicular movements.
Material Assets	Neutral
Landscape & Visual	No landscape screening of infrastructure from spoil bunds.
Cultural Heritage (including architectural and archaeological aspects)	Neutral
Traffic and Transport	Less vehicular movement on local roads.

3.8 ALTERNATIVE TURBINE HAUL 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. Alternative transport routes to the Site were considered in relation to turbine components, general construction-related traffic, and site access locations.

3.8.1 Delivery to Site

3.8.1.1 Turbine Delivery Route

Turbine component delivery routes from the Port of Cork in Ringaskiddy included the N28, N40 and the N22. 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 14: Traffic and Transport**) shows that only relatively minor additional accommodation works will be required to accommodate the proposed turbines. A number of routes were considered to access the Site from the N22. These routes are outlined on **Figure 3.5**.

3.8.1.2 Civil Construction Haul Route

The local road network in the vicinity of the Site and the supplier locations were assessed for the Civil Construction Haul Route. A number of the local roads were not suitable as they were too narrow, or they would have required significant upgrade works.

The proposed Civil Construction Haul Route is shown on **Figure 14.3** and **Figure 14.4 of Chapter 14: Traffic and Transport**.

Specific grades of rock fill will be required as fill under Turbine Foundations while sub-base and base course materials for the access track and Turbine Hardstand construction will be sourced on site from the borrow pit. Concrete, crushed stone and concrete blocks for construction of the Proposed Development will come from licensed quarries in the locality such as:

- Mid Cork Quarries
- Kilmichael Quarry
- McSweeney Bros
- Roadstone Castlemore
- Keohane Quarry
- Finbarr O'Neill Limited
- Roadstone Ballygarvan

These quarries will also be the source of crushed stone and road surfacing for widening works to the Turbine Delivery Route (existing roads) and for Grid Connection works.

For the Grid Connection, general material excavated from trenches in public roads will be disposed of to a licensed facility while excavated road surfacing material will be recycled. Excavated road surfacing materials will be recycled and used for temporary reinstatement of trenches. General soil waste will be transported to one or more of the licensed facilities listed in the Waste Management Plan in **Appendix 2.1: Construction Environmental Management Plan**.

Soil and stone spoil from road widening on the Turbine Delivery Route will be disposed of to the same facilities.

Bitumen and supplementary road surfacing for trench reinstatement can be sourced from (subject to competitive tender prior to construction) Lehane Tarmacadam, Kilbarry, Macroom, Co. Cork or McSweeney Bros, Kilmichael or Murray Bros Tarmacadam Ltd., Ardcahan and will use the routes as shown on **Figure 14.4** and **Figure 14.5**.

3.9 ALTERNATIVE MITIGATION MEASURES

Mitigation by avoidance has been central to the Project's evolution. By avoiding the ecologically sensitive areas of the Site as much as possible, the potential for environmental effects is reduced. 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 at least partly mitigated with the proposal of enhancement lands.

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.

3.10 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 Development and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects has been provided.