# 3 ALTERNATIVES CONSIDERED

## 3.1 INTRODUCTION

This chapter of the Environmental Impact Assessment Report (EIAR) provides a description of the reasonable alternatives examined by the Developer, which are relevant to the Garrane Green Energy Project (the Project) and its specific characteristics. It includes a summary of the main reasons for the option chosen, taking into account the effects of the Project on the EIAR Study Area/surrounding environment. Alternatives were assessed in accordance with relevant legislation (EIA Directive) and guidance (Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, EPA 2022) 2022 and Guidance on the preparation of the EIAR, European Commission 2017;).[1]. The assessment considers the potential effects during the following phases of the Project:

- Construction of the Project
- Operation of the Project
- Decommissioning of the Project

## 3.2 STATEMENT OF AUTHORITY

This chapter has been prepared Jennings O'Donovan & Partners Limited. It was prepared by Siobhan Roddy and was reviewed by Andrew O'Grady. Author qualifications and experience are detailed in **Appendix 1.1** and outlined below.

Siobhan Roddy is an Environmental Scientist with a BSc in Environmental Science and Technology from Dublin City University. She has experience through various projects since joining JOD with a current focus on the environmental sector. Siobhan's key capabilities are in report writing of EIAR Chapters, Appropriate Assessments, Natura Impact Statements, Feasibility Studies and using software such as ArcGIS Pro.

Andrew O'Grady is a Senior Environmental Consultant and holds a Bachelor (Hons.) Degree in Geography from University of Coventry and a MSc. in Environmental Resources Management from the Free University, Amsterdam. He has worked in environmental consultancy for over fifteen years and has prepared various Environmental Reports and EIARs.

[1] Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014-52/EU) (2017) European Union. https://op.europa.eu/en/publication-detail/-/publication/2b399830-cb4b-11e7-a5d5-01aa75ed71a1, [Accessed: 27/06/2025]

## 3.3 METHODOLOGY

### 3.3.1 Requirements for Alternatives Assessment

Article 5(1) of the Environmental Impact Assessment of Projects Directive 20211/92/EU as amended by Directive 2014/52/EU (EIA Directive) 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, Part 3 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' (EPA Guidance 2022), 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[2], stipulate the following:

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

The alternatives can include:

- a 'do-nothing' alternative;
- alternative locations;
- alternative layouts;

[2] EPA. (2022). Guidelines on the information to be contained in Environmental Impact Assessment Reports. Available at https://www.epa.ie/publications/monitoring--assessment/assessment/EIAR_Guidelines_2022_Web.pdf. Accessed at [27/06/2025]

- 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*[3]*.*

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 3**, 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 specification
- Alternative Layout and Design
- Alternative transport route and Site access
- Alternative Grid Connection
- Alternative mitigation measures

When considering a wind farm project, 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 Commission, 2017) states that

[3] Ref CJEU Case 461/17.

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"*.

The objective of the Developer was to identify a site capable of producing circa 50MW wind energy project in a suitably zoned location in the Limerick County Development Plan.

Other technology types (such as solar) have not been assessed as this is not in line with the project objectives to develop a wind farm and to maximise the energy capacity output from a zoned site in line with targets and objective.

## 3.4 'DO-NOTHING' ALTERNATIVE

Annex IV, Point 3 of the EIA Directive 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.

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 climate neutral economy, this is outlined in further detail in **Chapter 4: Planning and Legislative Context.** The binding EU targets have been transposed into Irish National Policy in the 2024 and 2025 Climate Action Plan which focuses up to 9 GW future electricity production on the onshore wind energy sector accounting for 80% of the share of electricity demand by 2030 together with offshore wind (5GW), solar (8GW) and new flexible gas plant (2GW). This demonstrates the significance of wind energy in the Irish energy context and highlights the need for the proposed Garrane Green Energy Project in reaching both EU and national renewable energy targets.

As outlined in the revised Directive EU/2023/2413[5] Ireland is obliged to ensure that 42.5% of the total energy consumed in heating, electricity and transport is generated from

[5] Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652 http://data.europa.eu/eli/dir/2023/2413/oj [Accessed: 27/06/2025]

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 (2025) 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 (but has been extended to 2029). These closing 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) prescribes a reduction of 51% of 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 Project will not be constructed. The land upon which the Project would occur would remain unchanged. 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 Limerick's wind energy resource would be lost at this Site. The environmental effects of the 'Do-Nothing' scenario compared to the wind farm development is detailed in **Table 3.1**.

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 recently published EPA report Ireland's Greenhouse Gas Emissions Projections 2024-2055 (May 2025) highlighted that Ireland is not on track to meet the national target of 51% emissions reduction target by 2030 compared to 2018 under the Climate Action and Low Carbon Development 2015 (as amended), nor is it projected to meet its EU target of 42% emissions reduction compared to 2005 under the Effort Sharing Regulations.

The Project has the potential to prevent approximately between 46,689 tonnes of $CO_2$ emissions per annum, or 1,634,117 tonnes of $CO_2$ emissions will be displaced over the proposed 35-year lifetime of the wind farm, see **Chapter 13: Air Quality 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 contrary to the Paris Agreement to the United Nations Framework Convention on Climate Change (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 the 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 Project will be lost. These benefits include an estimated 60 jobs during the construction phase of the project, and 2 long-term jobs once operational. Furthermore, under the "Do-Nothing" scenario the local community will not benefit economically from the community benefit fund associated with the Project which could be used to improve physical and social infrastructure within the vicinity of the Project.

The potential environmental effects of the 'Do-Nothing' Alternative when compared against the choice 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 project**

| Criteria | Residual Effect of the Project | Do-Nothing Alternatives |
|---|---|---|
| **Population & Human Health** | 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 via the community benefit fund. |

| Criteria | Residual Effect of the Project | Do-Nothing Alternatives |
|---|---|---|
| **Terrestrial Ecology** | The loss of neutral and wet grassland as a result of the proposed Project will result in a residual Slight negative effect at a Local level. Through the BEMP, the proposed Project will result in a net gain of hedgerow/treeline within the site, as well as the creation of 0.67 ha of new native woodland. Therefore, a Positive effect for biodiversity within the site will accrue over time. | Main land use on site, namely animal grazing, will continue. Without intervention, there would be no improvement in habitat quality or expansion leading to a missed opportunity for ecological enhancement. |
| **Aquatic Ecology** | With the appropriate mitigation in place there is expected to be no negative residual effect on any aquatic species, habitat or on water quality at a local or catchment level as a result of the Project. | If the Project does not proceed, lands at and in the vicinity of the Site will likely continue to be used for agricultural purposes. This 'Do-Nothing' scenario would result in no significant change in effects to aquatic ecology and habitats within or downstream of the Site subject to the continuation of current activities and practices. |
| **Ornithology** | Enhancements laid out within the BEMP (**Appendix 6.2**) would ensure that the Project has an overall positive effect on those sensitive ornithological features identified within this assessment as well as biodiversity as a whole. | The future baseline in the presence of the 'do-nothing impact' will, in general, be relatively similar to the current baseline, and the populations of the ornithological features that are relevant to the Project would be largely consistent with that of the existing baseline conditions. |
| **Soils & Geology** | The residual effects on the soils and geology environment as a function of the Project is that there will be a change in ground conditions at the Site with natural materials such as subsoil and bedrock being replaced | Should the proposed Project not proceed, the existing land-use practices will continue with associated modification of the existing environment, including the underlying soils and |

| Criteria | Residual Effect of the Project | Do-Nothing Alternatives |
|---|---|---|
| | by concrete, subgrade and surfacing materials. This is a negative impact of moderate significance at a local scale. | geology, through agriculture with no significant change in effects on soils and geology. |
| **Hydrology & Hydrogeology** | Non-significant effects following implementation of mitigation measures. | Should the proposed Project not proceed, the existing land-use activities will continue with associated gradual alteration of the existing environment and associated pressures on surface water and groundwater quality. The flood plain extents will remain as they are. |
| **Air & Climate** | Slight to moderate temporary localised residual effects arising from fugitive dust emissions during construction. Long-term positive effect on air quality and climate due to avoidance of burning of fossil fuels and the net displacement of 46,689 of $CO_2$ per annum. | There will be no improvement in air quality or a reduction of greenhouse gas emissions. By the Project not proceeding, it will not assist in achieving the renewable energy targets set out in the Climate Action Plan 2025. 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. Long-term slight to moderate negative effect on the dwellings closest to the project as a result of the operational phase. | There will be no change in noise emissions. |
| **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 are assessed in **Chapter 12 Landscape and Visual Assessment**. It is not considered that there will be any significant | The receiving landscape stays in the same or similar condition as it currently is. |

| Criteria | Residual Effect of the Project | Do-Nothing Alternatives |
|---|---|---|
| | effects arising from the proposed Garrane Green Energy Project. | |
| **Material Assets** | The Project will have a temporary, slight, negative impact on agricultural land use due to the removal of grazing lands during the construction phase and a long-term slight negative impact on agricultural land use for the duration of the operation phase of the Project.<br><br>The Project will have a Positive impact by offsetting use of fossil fuel. Positive impact due to provisions of electrical infrastructure. No significant effects from waste. Slight negative effect on natural resources in the area. | If the Project does not proceed, lands within the Redline Boundary of the Site will continue to be used for agricultural purposes. In this case, the likely evolution of the baseline environment is to a reduction in soil fertility. Further details can be found in **Chapter 16: Material Assets and Other Issues**, **Section 16.4.3**.<br><br>Under the Do-Nothing Scenario, there will be no offset to fossil fuel use and no provision of additional renewable electricity generation infrastructure in the local area. |
| **Cultural Heritage** | A potential slight/moderate range of significance of effect in the context of residual effects on the unrecorded archaeological resource.<br><br>Slight-moderate, Long-term, adverse, indirect visual effects on cultural heritage constraints within surrounding lands. No residual impacts envisaged that cannot be reversed following decommissioning. | There will be no potential for Cultural Heritage effects. |
| **Traffic and Transport** | Moderate localised short-term impact due to construction and decommissioning activities. During operation, effects are predicted to be not significant. | No potential for increased traffic during construction. |

## 3.5 STRATEGIC SITE SELECTION

The process of identifying a suitable wind farm is influenced by a number of factors. It can be broken down into 3 No. phases:

A series of steps were undertaken in the screening:

- Phase 1: Initial Screening,
- Phase 2: Grid Constraints and Facilitators, and
- Phase 3: Other Constraints and Facilitators.

### 3.5.1 Phase 1: Initial Screening

A number of criteria were applied to identify what sites might be available, in theory for wind energy development. Initially, the Developer considered suitable sites based on designations in the Limerick City and County Development Plan. The wind energy designations map of the Limerick City and County Development Plan in Chapter 9: 'Climate Action, Flood Risk and Transition to Low Carbon Economy'[6] were used as the basis for the initial screening.

Areas classed as 'Open to Consideration' and 'Preferred' in the County Development Plan were examined using a GIS exercise applying a buffer around sensitive receptors, namely, houses. The buffer was derived with due regard to the Draft Revised Wind Energy Development Guidelines (Department of Housing, Local Government and Heritage, 2019) which stipulates a setback of four times turbine tip height being appropriate. The setback criteria were applied both to existing residences and to sites with planning permission granted by Limerick City and County Council but not yet constructed. **Figure 3.1** shows the five potential site locations based on the County Development Plan designations and indicative housing setbacks.

These five potential sites were further screened and assessed through the application of key spatial datasets such as ordnance survey land data, house location data, transportation strategic development corridors, 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 wind farm project in excess of 50MW while minimising the potential for adverse effects to the surrounding environment.

Potential sites were assessed against the following:

- Available Wind Resource

[6] https://www.limerick.ie/sites/default/files/media/documents/2023-05/Limerick-Development-Plan-Volume-1-Written-Statement-including-Variation-No-1.pdf

- Environmental designations such as Natura 2000 and Nationally Designated Sites (SAC, SPA, NHA, pNHA)
- Tourism
- Ornithology
- Planning Precedence
- Terrain / Land Use
- Archaeological Designations
- Landscape and visual designations

### 3.5.2 Phase 2: Potential for Grid Connection

As part of the site selection process, the Developer considered the potential grid connection, including distance to potential connection points and the capacity of the grid to accommodate the proposed development.

Following the application of grid constraints to the number of potential wind farm sites identified, a number of sites were discounted due to unviable grid connection points due to excessive distances, complex/expensive grid connection options or grid capacity not being available.

### 3.5.3 Phase 3: Other Constraints and/or Facilitators

Five potential sites remained following Phase 1 and Phase 2 screening. Phase 3 included the screening of known local issues or other constraints and/or facilitators such as:

- Amenity, Tourist or Scenic Areas designated in development plans
- Size of Site or Development Area
- Sensitive Habitats/Species
- Land Ownership Issues
- Sites with impractical/irregular shape/layout/topography

The application of the above criteria resulted in the further elimination of four unsuitable sites. **Table 3.2** outlines the various sites identified and reasons for not proceeding. Through the screening process, the Project site was identified as the preferred candidate site to take through the next stage of validation and design iterations.

**Table 3.2: Screening of Potential Sites Identified**

| Site | Screening – Reason for Not Proceeding |
|---|---|
| 1 | M20 project corridor granted through the site, prohibiting further development |
| 2 | Potential Project Scale- Buffered Watercourses significantly reduce developable area |
| 3 | Potential project scale- Insufficient developable area to achieve circa 50MW |
| 4 | Site Designated as Open to Consideration by Limerick City and County Council<br>Unviable Grid Connection – circa 12km cable route with rail and national road crossing to Charleville 110kV substation, which doesn't have scope to facilitate additional connection without significant upgrade works |

### 3.5.4 Summary of Site Suitability Criteria

The Project site at Garrane in Co. Limerick, 2.5km north of Charleville, 22.9km south of Limerick City and 46.9km north of Cork City was the candidate site brought forward for more detailed analysis. Following phase 1 - 3 of the site selection process the Project site was the candidate site brought forward as it successfully met the key criteria for wind energy development. The Project site was selected based on the following:

#### *3.5.4.1 Wind Resource*

The Irish Wind Atlas produced by Sustainable Energy Ireland shows average wind speeds for the country. The Wind Atlas shows that wind speeds on the Site are consistent with a wind farm project (5.4m/sec at 30m, 6.7m/sec at 75m, and 7.2m/sec at 100m).

#### *3.5.4.2 Proximity to Grid*

The proposed project at Garrane is located within 4.4km north of the existing Charleville 110kV substation. The Kilmallock 38kV substation is located 6.8km east of the Site and the Milford 38kV substation is located 13km west of the Site. The existing 110kV overhead lines between Charleville 110kV Substation and Killonan 110kV Substation pass through the south of the Site and could facilitate a 'Loop-in' connection depending on the capacity of the proposed wind farm. Therefore, a wind energy project at this location has a number of route options to enable connection to the national electricity grid, shown below in **Figure 3.2**.

#### 3.5.4.3 Compliance with Planning Policy/Designation

The CDP 2022-2028 and the policies of the new CDP are outlined below. In the Wind Energy Strategy that accompanies the CDP, proposed Site is in an area classed as 'Preferred Areas' for wind energy development.

***County Development Plan Strategy Objectives***

The CDP has the following Strategic Objectives:

1. *"Grow Limerick's economy and create opportunity through maximising the potential for development through the promotion and enhancement of the competitive advantages of Limerick, including its strategic location, connectivity and accessibility to international markets, a skilled workforce and a high quality of life. The Limerick brand shall be used to internationalise the city. Any further brands created within and by the Local Authority, including organisations owned by the Local Authority, shall work within the framework outlined in the 'Limerick Atlantic Edge, European Embrace' brand."*
2. *"Transition to an environmentally sustainable carbon neutral economy."*
3. *"Ensure new and existing residential development is of the highest quality, enabling life cycle choices and physical, community, recreation and amenity infrastructure are provided in tandem, to create sustainable, healthy, inclusive and resilient communities."*
4. *"Protect the unique character of Limerick. Support and facilitate revitalisation and consolidation of the City, towns and villages, through public realm and place-making initiatives. Address vacancy and dereliction to create compact attractive, vibrant and safe environments in which to live, work, visit and invest. Ensure the highest quality of public realm and urban design principles are applied to all new developments, including the construction of landmark buildings in appropriate locations."*
5. *"Create a competitive environment in which to do business. Promote, support and enable sustainable and economic development, enterprise and employment generation. Focus in particular on areas which are accessible by public and sustainable modes of transport. Enable settlements and rural areas to become self-sustaining through innovation and diversification of the rural economy."*
6. *"Reduce car dependency and promote and facilitate sustainable modes of transport. Prioritise walking, cycling and public transport. Provide an appropriate*

*level of road infrastructure, road capacity and traffic management, to support existing and future development and enhance connectivity."*

7. *"Protect, enhance and ensure the sustainable use of key infrastructure, through the provision of support to utility providers including water supplies and wastewater treatment facilities, energy supply including renewables, broadband and transportation. This plan will also foster the linkages to transition from linear model to a circular model which keeps resources in use for as long as possible."*
8. *"Protect, enhance and connect areas of natural heritage, green infrastructure and open space for the benefits of quality of life, biodiversity, protected species and habitats, while having the potential to facilitate climate change adaptation and flood risk measures."*
9. *"Protect, conserve and enhance the built and cultural heritage of Limerick, through promoting awareness, utilising relevant heritage legislation and ensuring good quality urban design principles are applied to all new developments. The principle that well planned and integrated development enhances the sustainability, attractiveness and quality of an area should be at the centre of any proposal."*
10. *"Support growth in the tourism sector in Limerick, specifically focusing on sustainable tourism, and capture key opportunities to develop the sector based around five key drivers – Greenways, Waterways, Activities, Heritage, Arts and Culture, in an urban and a rural environment."*

In Chapter 9: Climate Action, Flood Risk and Transition to Low Carbon Economy that accompanies the CDP, the proposed Site is in an area classified as 'Preferred Areas' for wind energy development. The Strategic Environmental Assessment (SEA) Environmental Report was also consulted.

The following objectives from the CDP are relevant;

**Objective CAF O28 Assessment of Renewable Energy Projects**

It is an objective of the Council to encourage the development of wind energy, in accordance with Government policy and having regard to the principles and planning guidance set out in the Department of Housing, Planning and Local Government publications relating to Wind Energy Development and the DCCAE Code of Practice for Wind Energy Development in Ireland and any other relevant guidance, which may be issued in relation to sustainable energy provisions during the course of the Plan.

**Objective CAF O29 Wind Energy Development and Environmental Considerations**

It is an objective of the Council to facilitate the development of wind energy in an environmentally sustainable manner, ensuring proposals are consistent with the landscape character objectives of the Plan, the protection of the natural and built environment and the visual and residential amenities of the area.

**Objective CAF O30 Location of Wind Energy Developments**

It is an objective of the Council to promote the location of wind farms and wind energy infrastructure in the 'preferred areas' as outlined on Map 9.1, to prohibit such infrastructure in areas identified as 'not open for consideration' and to consider, subject to appropriate assessment, the location of wind generating infrastructure in areas 'open for consideration'.

**Objective CAF O31 Wind Energy supporting Infrastructure**

It is an objective of the Council to support the development of appropriate landbased infrastructure and facilities at suitable locations, in order to facilitate the necessary connections for off- shore renewable energy projects.

**Objective CAF O33 Development of Foynes Port**

It is an objective of the Council to support the development of Foynes Port, as a support base for offshore wind, both during any initial exploration phase and also during the subsequent construction and operational and dismantling phases, subject to appropriate levels of environmental and ecological assessments.

**Objective CAF O34 Wind Energy Development**

It is an objective of the Council to ensure that wind energy developments on sensitive or sloping sites, or any significant alterations to them, are accompanied by adequate assessment of the effects of the development on soil stability.

**Objective CAF O35 Community Based Energy Initiatives**

It is an objective of the Council to support community energy-based initiatives, subject to adequate assessment, to help achieve low carbon communities.

**Objective CAF O36 Life Extension and Repowering of Wind Farms**

It is an objective of the Council to support the life-extension and repowering of existing wind farms, where considered appropriate and subject to an appropriate level of environmental and planning assessment.

#### 3.5.4.4 Avoidance of European Designated Sites

The Site is not located within any area designated for ecological protection, as shown in **Figure 3.3** The nearest Natura 2000 sites, i.e., Special Area of Conservation (SAC) or Special Protection Area (SPA) is the Blackwater River (Cork/Waterford) SAC (Site Code: 002170) located 8.4km south of the Site and the Ballyhoura Mountains SAC (Site Code: 002036) located 8.9km southeast of the Site at the nearest point.

#### 3.5.4.5 Separation Distance from Residential Dwellings and Population Density

A minimum setback of four times the tip height of 680m was applied to residential properties in the surrounding area. As the feasibility studies progressed, this dwelling setback distance was further refined based on turbine size and location to comply with project and area specific details. 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 area has emerged as suitable to accommodate the proposal. The population density of the EIAR Study Area (as described in the **Chapter 5: Population and Human Health**) is 18 persons per square kilometre. This is significantly lower than the average national population density of 73 persons per square kilometre[7].

## 3.6 ALTERNATIVES CONSIDERED

This section outlines the primary reasonable alternatives examined and considered during the proposed Project's design process and indicates the main reasons for choosing the Project as proposed.

The alternatives considered included the following:

- Alternative Turbine Numbers, Specifications, Layout and Design
- Alternative Turbine Delivery Route and Site Access
- Alternative Mitigation Measures

### 3.6.1 Alternative Turbine Numbers and Specifications

#### *3.6.1.1 20 Turbine Layout*

As shown in **Figure 3.4**, the developable footprint originally encompassed an area both sides of the existing N20 and consisted of up to twenty turbines. In March 2022, the N/M20 Cork to Limerick motorway project determined a preferred corridor for the route of the new motorway. This impacted on the developable area available on the western side of the

[7] Central Statistics Office https://www.cso.ie/en/releasesandpublications/ep/p-cpp1/censusofpopulation2022profile1-populationdistributionandmovements/populationdistribution/ [Accessed 27/06/2025]

existing N20 national road, thus the project area was refined to focus on the area to the East of the N20.

#### *3.6.1.2 11 Turbine Layout*

**Figure 3.5** shows the potential developable area to the East of the N20 and the initial proposed layout which consisted of eleven turbines with rotor diameters of circa 136m. Design workshops held with the individual discipline leads identified potential effects of the eleven turbine layout on, in particular, Landscape & Visual Impact Assessment (LVIA), Archaeology and Telecoms. LVIA noted that the turbine furthest to the west was within 250m of the N20 and movement further to the east would be preferential. Analysis of LiDAR flyover data and site visits by the Archaeologist highlighted previously unrecorded features, which needed to be considered in the design constraints. An extension to the north of the Site was considered and this would have added an additional 4 turbines in an array from north to south being included in the Project. However, this was discounted due to proximity to residential receptors.

#### *3.6.1.3 9 Turbine & 7 Turbine Layout Assessment*

Further site investigation and refinement of constraints resulted in the assessment of two viable layout options; a nine turbine layout with a rotor diameter of 150m and hub height of 95m and a seven turbine layout with a rotor diameter of 162m with a hub height of 95m. This layout change from eleven turbines to either a nine turbine or seven turbine layout occurred due to the main constraints on site:

- Houses (800m buffer) for the larger turbine model
- Flood risk
- Watercourses/Hydrological buffers
- Telecoms links
- Archaeological features
- Kerry Group pipeline

The seven turbine layout is shown in **Figure 3.6a** and the nine turbine layout is shown in **Figure 3.6b**.

A comparison of the potential environmental effects of the installation of nine turbine layout compared against seven turbine layout are presented in **Table 3.3**.

**Table 3.3: Environmental Effect Comparison – 9 Turbine layout compared to 7 Turbine Layout**

| Criteria | 9 Turbines | 7 Turbines |
|---|---|---|
| **Population & Human Health (incl. Shadow Flicker)** | Difference between the layout is negligible for population & human health and shadow flicker. | Larger turbines, with higher hub height would increase the number of nearby sensitive receptors included in the shadow flicker assessment. |
| **Biodiversity** | A nine turbine layout will result in a larger construction footprint, likely increasing habitat loss. Although the difference is slight. | Seven turbine layout would have larger turbines and larger civil infrastructure at individual turbine locations, but would likely have a smaller construction footprint overall and therefore less habitat loss. The effect on biodiversity would be slight and not significant. |
| **Ornithology** | Difference between layouts is negligible from a collision risk perspective. | Difference between layouts is negligible from a collision risk perspective. |
| **Soils & Geology** | Difference between the layout is neutral for soils and geology. | Difference between the layout is neutral for soils and geology. |
| **Hydrology & Hydrogeology** | Nine turbine layout is likely to have smaller impact on flood storage, this is due to the size of the hardstands (smaller) and length of access track in the flood zone. | Indicative flood risk analysis shows that the seven turbine layout is likely to have a marginally larger impact on flood storage. |
| **Air & Climate** | The impact on emissions from construction vehicles is neutral. However, from nine turbine layout has a larger installed capacity so is likely to offset more carbon during the project operational lifetime. | The impact on emissions from construction vehicles is neutral. However, the seven turbine layout has a smaller installed capacity when compared to the nine turbine layout so is likely to offset less carbon during the project operational lifetime. |
| **Noise** | Difference between the layout is neutral for noise. | Difference between the layout is neutral for noise. |
| **Material Assets** | There are no conflicts with existing Telecoms links. | Preliminary analysis of the impact on Telecoms indicates that one of the turbines in the 7 turbine layout would be in conflict with an existing comms link. |
| **Landscape & Visual** | A larger number of turbines would have a slightly greater visual impact. However, the | Less intensity from fewer turbines, however the differential slight. |

| Criteria | 9 Turbines | 7 Turbines |
|---|---|---|
| | difference between layouts is negligible. | |
| **Cultural Heritage** | Difference between the layout is neutral for cultural heritage. | Difference between the layout is neutral for cultural heritage. |
| **Traffic and Transport** | Difference between the layout is neutral for traffic and transport. | Difference between the layout is neutral for traffic and transport. |

Subsequently it was decided to proceed with the nine turbine layout across five landowners with a rotor diameter of 150m. The nine turbine layout was chosen to maximise the potential output with a turbine type more suited to the developable area and less overall effects on the environment, in particular on hydrology (flood storage), noise, cultural heritage and landscape and visual effects. This has resulted in the current nine turbine layout with a rotor diameter of 150m. The turbine coordinates and foundation levels are detailed in **Table 3.4**.

From further design assessments including house buffers, turbine types, telecommunication links etc it was decided that the turbines would have a tip height of 170m.

**Table 3.4: Turbine Coordinates & Foundation Levels**

| Turbine No. | ITM Easting (m) | ITM Northing (m) | ING Easting [m] | ING Northing [m] | Top of Foundation Level (m OD) |
|---|---|---|---|---|---|
| T1 | 554494 | 626040 | 154539 | 126005 | 61.45 |
| T2 | 554358 | 626367 | 154403 | 126332 | 58.80 |
| T3 | 554070 | 626632 | 154115 | 126597 | 58.10 |
| T4 | 554378 | 626844 | 154423 | 126809 | 57.81 |
| T5 | 554107 | 627092 | 154152 | 127057 | 57.81 |
| T6 | 554452 | 627196 | 154497 | 127161 | 57.81 |
| T7 | 554352 | 627558 | 154397 | 127523 | 57.81 |
| T8 | 553804 | 627520 | 153849 | 127485 | 57.81 |
| T9 | 554073 | 627806 | 154118 | 127771 | 57.81 |

The proposed wind turbines will have a potential power output of 6MW. It is proposed to install nine turbines which could achieve 54MW output. This final layout is the most appropriate design for the site conditions.

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 nine turbine layout selected has the most suitable project footprint and achieves the optimum output at a more consistent level than would be achievable using different turbine layouts.

The turbines proposed will have a tip height of 170m, a rotor diameter of 150m and hub height of 95m.

### 3.6.2 ALTERNATIVE LAYOUT AND DESIGN OF NINE TURBINE LAYOUT

This phase is the refinement of the nine turbine layout following detailed site constraints analysis. The design of the Project 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 significant environmental effects while designing a project capable of being constructed and viable. Throughout the preparation of the EIAR, the layout of the Project 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 **Chapter 1: Introduction, Section 1.10** and in **Appendix 1.3** of this EIAR.

#### *3.6.2.1 Constraints Led Approach*

The design and layout of the Project 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 has due regard to the Draft Revised Wind Energy Development Guidelines, December 2019 (Draft Wind Energy Guidelines 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 Project works will take place. The size of the buffer zone for each constraint has been assigned using guidance presented in the Wind Energy Development Guidelines (Department of the Environment, Heritage and Local Government, 2006) and other relevant Best Practice standards, which are identified in each chapter of this EIAR. The proposed setbacks have regard to the Draft Wind Energy Guidelines 2019 requirements.

The constraints map for the Site, as shown in **Figure 3.7** encompasses the following constraints and associated buffers in accordance with relevant guidance/best practice and professional judgement:

- Distance to watercourses of at least 50m.
- Distance to land drains of at least 10m, where possible.
- Distance to recorded archaeological monuments and structures of at least 20m from the outer edges of all known and potential archaeological sites within the Site (professional judgement based on experience)
- Distance from turbines (T1, T2, T3 & T9) to inhabited houses of at least 500m for involved landowners and 680m for non-involved houses. Note there is an increased set-back from turbines (T4, T5, T6, T7 & T8) located within the floodplain to account for the raised plinth.
- Existing high voltage overhead powerlines on the south of the site where a 2 x fall over distance buffer to wind turbines is applied.
- Avoidance of more sensitive habitats, e.g., hedgerows and watercourses.
- The mapped 1:1,000 year flood event extents on Site.
- Minimising interaction with the existing industrial outflow pipeline passing through the Site from south to north.
- Setback distance of blade tip height plus 10% from turbines to the national road (N20).

This demonstrates the avoidance of significant effects 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 the Project
- Separation distance from landowners
- 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

The inclusion of the constraints on a map of the developable area allowed for a viable project area to be identified. An initial nine turbine layout was then developed to take account of all the constraints mentioned above, 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 6: Biodiversity**, were used to inform the selection of the optimal siting of turbines and associated infrastructure works (e.g. construction of Access Tracks, Turbine Hardstands, Substation etc.).

Similarly, the hydrological and geotechnical investigations of the Site informed the proposed locations for turbines, Access Tracks and other components of the Project, such as the Onsite Substation, Met Mast and the Temporary Construction Compound. This included Site Investigation works (**Chapter 9: Soils and Geology**) and the identification of watercourses, groundwater constraints, flood risk and wells (**Chapter 10: Hydrology and Hydrogeology**). Where specific areas were deemed as unsuitable (e.g., in the vicinity of mapped archaeological features and/or potential features not yet mapped (as identified via Lidar)) 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 wind farm has also been informed by wind data which has been collected from a lidar measurement and the results of noise assessments as they became available.

### 3.6.3 Turbine Layout

The final proposed turbine layout of the Project takes account of all site constraints and the distances to be maintained between turbines and 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

numbers and layout has had regard to wind speed, noise and shadow flicker impacts and the separation distance to be maintained between turbines.

The wind farm design process and related EIAR were an iterative process. Findings at each stage of the assessment were used to further refine the design, always focused on minimising the potential for environmental effects. The development of the final proposed wind farm layout reflects the findings, and recommendations from a range of site surveys and assessments, in addition to ongoing negotiation and discussions with the landowners. There were several reviews of the specific locations of the various turbines during the optimisation of the Site layout. The initial constraints study identified a significant viable area, suitable for nine turbines. The initial turbine layout, shown in **Figure 3.6** occupied the viable area within the wider Study Area. However, the proposed turbine locations were refined following feedback from the project team, the Developer, and telecommunications providers who have links running through the Site. The final turbine layout is considered optimal because the alternative, earlier iterations of the layout had the potential for greater environmental effects.

The first iteration of the turbine layout, shown in **Figure 3.6**, refined the nine turbine layout. This layout was refined with relatively minor movements of Turbine Hardstands and Access Track alignments following a design team workshop and feedback from ongoing environmental studies. Following consultation with Limerick City and County Council and Transport Infrastructure Ireland (TII), a site entrance was added on the L1537 so that the main construction access could be located off the N20. It was planned that abnormal loads for turbine components would access the Site from the site entrance on the N20 (Site Entrance 1) and egress via the same entrance, this was updated to utilise a second site entrance on the L1537 (Site Entrance 2) so that there would be less traffic using the access on the N20. A third site entrance (Site Entrance 3) was added on the L1537 for the construction of the Substation and Grid Connection.

Following, further studies and discussions with landowners involved in the Project, it was decided to remove Site Entrance 2 and use Site Entrance 3 as the main entrance and egress to and from the Site for both construction and operation. This would involve moving the existing entrance to south and widening the entrance to achieve the required turning area and sightlines, combined with traffic management measures on the L1537. This change had the added benefit of only requiring one single Temporary Construction Compound (where the earlier layout required two Temporary Construction Compounds, one for the main Site and another for the Substation) and a reduction in the overall length of

Access Track including a significant portion (circa 500m) within the flood zone, thereby reducing the impact on flood storage.

It was also at this point that the Redline Boundary of the Site for the purposes of the EIAR was defined. The initial Redline Boundary was amended to focus on the final iteration of the layout and proposed site entrances and access routes. The final proposed turbine layout as presented in **Figure 1.2** takes account of all Site constraints (e.g. ecology, ornithology, hydrology etc.) and design constraints (e.g. setback distances from houses and third-party lands/infrastructure and distances between turbines on-site (for wind take effects) 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 iteration when compared against the final layout are presented in **Table 3.5**.

**Table 3.5: Environmental Effects from Initial to Final Layout**

| Criteria | Initial Constraints Layout (Figure 3.6) | Final Layout (Figure 1.2) |
|---|---|---|
| **Population & Human Health** | No material difference in terms of effects for population or human health. | No material difference in terms of effects for population or human health. |
| **Biodiversity** | No significant environmental effects | No significant environmental effects |
| **Soils & Geology** | Slight increase in the volume of spoil to be managed. | This layout was amended following initial geotechnical investigations to reduce the volume of spoil to be managed. This constituted reducing a decision to utilise piled foundations for turbines located within flood zones, no suitable locations for an onsite borrow pit resulting in less excavations on site and reduction of road levels within flood zones. |
| **Hydrology & Hydrogeology** | Additional water crossing required for access track from T6 to T5. No significant residual effect. | Fewer watercourse crossings. The crossing from access track T6 to T5 is not required.<br>Removal of 3rd site entrance within flood zone and removal of 2nd temporary construction |

| Criteria | Initial Constraints Layout (Figure 3.6) | Final Layout (Figure 1.2) |
|---|---|---|
| | | compound within flood zone. No significant residual effect. |
| **Air & Climate** | Neutral | Neutral |
| **Noise** | Neutral | Neutral |
| **Material Assets** | Potential for impact to existing telecoms links traversing the Site. | No significant effects on existing telecoms links. |
| **Landscape & Visual** | Neutral | Neutral |
| **Cultural Heritage** | Neutral | Neutral |
| **Traffic and Transport** | New entrance onto busy National Road to be used for Construction, Operation and Decommissioning. Moderate effect on traffic and transport. | One new entrance onto relatively quiet local road. Upgrade of existing site entrance on N20 to be used for abnormal load delivery only. No significant effect on traffic and transport |

### 3.6.4 Site Access and Access Track Layout

Access Tracks are required to enable transport of infrastructure and construction materials within the Site. Access Tracks must be of a sufficient gradient and width to allow safe movement of equipment and vehicles. It was decided during the initial design of the Project that existing tracks would be utilised where possible to minimise the land take required and the resultant potential for impacts by constructing new tracks as an alternative. This has meant that where possible, the proposed Access Tracks have followed the existing access tracks on Site.

As the overall site layout was finalised, the most suitable routes between each component of the Project were identified, taking into account the existing tracks and the physical constraints of the Site. There are some sections of existing tracks on site, namely from the proposed Met Mast to T5 and from Site Entrance 2 towards the Substation. Locations were identified where upgrading of the existing track would be required. This primarily included where sections of new Access Tracks would need to be constructed, to ensure suitable access to and linkages between the various project elements, and efficient movement around the Site.

An alternative option would be to construct a new road network, having no regard to existing roads within the Site. However, taking environmental considerations into account the preferred option is that existing site access tracks will be upgraded, where possible, to make use of the existing footprint and reduce habitat loss.

Initially it was proposed to use the site entrance off the N20 as the main site entrance for all construction traffic and abnormal load deliveries. However, following consultation with Limerick City and County Council and Transport Infrastructure Ireland (TII), the Developer assessed options to deliver abnormal loads to the Project via;

1. N20, R518, Bruree village and L1537 and,
2. N20, Charleville town, R515 and L1537.

Option 1 would require temporary road modifications at the N20/R518 junction (O'Rourke's cross), the components would then travel along the R518 into Bruree village, prior to entering the village the components would be unable to negotiate the Monktown bridge over the Maigue river without significant modification works and most likely a new crossing. The bridge is narrow with two 90 degree bends at either side and is a recorded monument (Reg no. 21804008). For these reasons, this route option was assessed as unviable due to the scale of the works required.

Option 2 would require turbine components to enter the town of Charleville via the N20 turning left onto the R515 in the centre of the town. There are two options for this turn off, the initial turn onto the R515 would be negotiable with temporary modifications, however, the second turning, to the east, requires negotiation of an acute bend with buildings at all sides of the junction, thus this option is not plausible. The second option is to make the left hand turn off the N20 onto the R515 in the centre of the town, again this is not a viable option as there are buildings on all sides and the abnormal load vehicles would not be able to negotiate this bend.

For the above reasons, the only viable option for delivery of abnormal loads is delivery via modification of an existing entrance on the N20. In consideration of the TII consultation response, the Developer has minimised traffic volumes as far as practicable by utilising the N20 entrance for abnormal deliveries only. In addition, a temporary speed restriction is proposed on the N20 for the duration of the modification works of the existing entrance on the N20. In addition, it is proposed that all construction traffic will enter and exit via a site entrance on the L1537. It is proposed to only use Site Entrance 1 for the delivery of abnormal loads for turbine components and egress from Site Entrance 2 on the L1537 so that there would be less traffic using the access on the N20.

It was originally proposed to have 3 no. Site Entrances, Site Entrance 1 on the N20 to be used for abnormal load deliveries only, Site Entrance 2 to the east of the Site on the L1537 which was to be the primary site entrance for construction and operation and Site Entrance 3 to the south of the substation which was to be used during construction only for the construction of the substation.

Subsequently, Site Entrance 2 on the east of the Site was omitted due to landowner options and Site Entrance 3 became the primary access to the Site for construction and operational traffic (now referred to as Site Entrance 2). This change had the positive effect of reducing the length of access track required by c.500m. In addition, the "spine route" through the Site does not need to be constructed above the 1:1,000 year flood event to allow access to the entire Site for emergency services and ESB vehicles to access the substation, resulting in a reduced requirement for aggregates to build up the track and turbine hardstand levels.

### 3.6.5 Location of Ancillary Structures

The alternatives considered are discussed for the following ancillary infrastructure required for the Project. The ancillary infrastructure required for the proposed Project include a Temporary Construction Compound, Electrical Substation, Meteorological Mast and Grid Connection.

#### *3.6.5.1 Temporary Construction Compound*

The Temporary Construction Compound will be used as a secure storage area for construction materials and to contain temporary site units for sealed staff welfare facilities. The Temporary Construction Compound will contain cabins for offices space, meeting rooms, canteen area, a drying room, parking facilities, and similar personnel type facilities. The use of a single temporary construction compound as opposed to two smaller compounds located in different areas of the Site was considered and generally will result in less disturbances to the Site and a reduced visual impact during construction. Initially, it was considered that due to the design of wind farm, that two Temporary Construction Compounds would be more appropriate to reduce impact on the local road networks, carbon emissions and dust pollution from unnecessary travel throughout the Site. This scenario was considered when three Site Entrances were considered and would have reduced unnecessary vehicle movements up and down the Site. However, with the omission of Site Entrance 2, it is considered more appropriate and with less environmental effects to have a single Temporary Construction Compound next to the Substation.

The original plan was to have two no. Temporary Construction Compounds located on the northeast and southeast of the Site, with Site Compound 1 at Site Entrance 2 from the local road (L1537) and Site Compound 2 near Site Entrance 3, also on the L1537. However, this has been changed in favour of a single Temporary Construction Compound near the Substation. Details of the temporary Construction Compound can be seen in **Drawing No. 6839-JOD-GGE-DR-C-0801**. The use of a single Temporary Construction Compound instead of two smaller compounds located in different areas of the Site will result in less disturbance to the Site and 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 near the main Site Entrance and adjacent to the Substation.

A comparison of the potential environmental effects of constructing a single construction compound (2,976m$^2$) when compared against constructing two smaller compounds (2,000m$^2$ or 4,000m$^2$ in total) is presented in **Table 3.6**.

**Table 3.6: Environmental Effects from Constructing Two Smaller Construction Compounds Compared to One Large Construction Compound**

| Criteria | One Temporary Compound | Two Temporary Compounds |
|---|---|---|
| **Population & Human Health** | Potential for increased noise impacts on nearby sensitive receptors. | The same overall level of traffic but lower on specific routes as the traffic will use different parts of the road network therefore less traffic and noise impacts. |
| **Biodiversity** | Less impact to the Site ecology by constructing a single construction compound as the footprint of two smaller construction compounds is larger than one large compound. | Potential for a greater impact to the Site ecology by constructing two Temporary Construction<br>Compounds in different areas of the Site as the footprint of two smaller construction compounds is larger than one large compound. |
| **Ornithology** | The Site ornithological fauna is likely to be less impacted by one Temporary Construction Compound as the noise and disturbance will be concentrated in one area. There will also be less loss of habitat. | Potential for a greater impact to the Site ornithological fauna by constructing two construction compounds in different areas of the Site could result in habitat destruction and disturbance. |
| **Soils & Geology** | A smaller development footprint will result in lower volumes of spoil to be | Larger development footprint will result in greater volumes of spoil to be excavated and stored. |

| Criteria | One Temporary Compound | Two Temporary Compounds |
|---|---|---|
| | excavated and stored. Lower volume of stone required from quarries in the vicinity for road construction. | Larger volume of stone required from quarries in the vicinity for road construction. |
| **Hydrology & Hydrogeology** | The use of one Temporary Construction Compound site has the potential to reduce the risk of silt laden runoff to watercourses due to it being confined to one location. However, there will be a larger footprint close to small watercourse/drain at the Substation, than if there were two smaller compounds. With the implementation of drainage buffers and mitigation there will be no significant effect on hydrology and hydrogeology. | The use of multiple construction compounds sites has the potential to increase the risk to watercourses due to the additional generation of spoil in multiple areas. The compound would have been located within the flood zone and additional mitigations would have been required. |
| **Air & Climate** | Potential for an increase in vehicular emissions/dust due to an increase in distance travelled of construction traffic. However, these will not be significant. | Potential for reduction in vehicular emissions/dust due to reduction distance travelled of construction traffic. However, these will not be significant. |
| **Noise** | Potential for increased noise impacts on nearby sensitive receptors, however no significant difference predicted. | Potential for increased noise impacts on nearby sensitive receptors, however no significant difference predicted. |
| **Material Assets** | No significant difference. | No significant difference. |
| **Landscape & Visual** | Potential for less visual and landscape impacts due to the construction of one Temporary Construction Compound. However, this will not be significant. | Potential for increased visual and landscape impacts due to the construction of two Temporary Construction Compounds in different parts of the Site. However, this will not be significant. |
| **Cultural Heritage** | No significant difference. | No significant difference. |
| **Traffic and Transport** | One compound is less efficient for movement and management of material across the Site than with multiple compounds. A single compound would increase | Multiple compounds results in more efficient movement and management of material across the Site as the development is separated into two separate smaller sites. This would reduce |

| Criteria | One Temporary Compound | Two Temporary Compounds |
|---|---|---|
| | traffic movements on the existing road infrastructure on the L1537 road during construction as all traffic will use the same entrance which is better for site security, site access and emergency vehicle access. | traffic movements on the existing road infrastructure on the L1537 road during construction. |

#### *3.6.5.2 Electrical Substation*

In order to provide flexibility to the electrical network provider and having regard for the Site constraints, in particular the location of the existing overhead 110kV lines between Charleville 110kV and Killonan 110kV Substation, the location of the Substation is restricted to the south of the Site. It should also be noted that while the operational lifespan of the proposed turbines sought is 35 years (following which they may be replaced or decommissioned, or the Site may be repowered). The 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.

#### *3.6.5.3 Grid Connection*

A key consideration in determining the Grid Connection (GC) for a proposed wind energy project 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 and are generally more acceptable as a result.

Initially two options for Grid Connection options (**Figure 3.2**) were under consideration:

- Option 1 - a 'Loop in' connection to the existing 110kV Overhead Lines between Charleville 110kV Substation and Killonan 110kV Substation to the south of the Substation.
- Option 2 – Underground connection to Charleville 110kV Substation with the route consisting of ducting in public roads for c.15.3km. There were two options in this, Option A which was to run to the east of the Site in public roads through Charleville and Option B which was to run to the west in public roads but avoid passing through Charleville. Option A was discounted in favour of Option B due to the potential for significant disruption to local road users and businesses in Charleville town.

Through additional surveys, it was found that Option 1 was the preferred Grid Connection option. This was due to Option 2 being a long connection in public roads which would have caused significant disruption to users of the local road network around Charleville. Option 2 also required the crossing of a watercourse that is hydrologically connected downstream to the Blackwater SAC. To reduce disturbance to residents and road users around Charleville (a busy market town) on the main Cork to Limerick N20 road and to protect the watercourse and associated downstream Natura 2000 site, Option 1 was selected as the preferred option. A comparison of the potential environmental effects of Option 1 and Option 2 is presented in **Table 3.7**.

**Table 3.7: Environmental Effects from GCR Option 2 compared with the preferred GCR Option 1**

| Criteria | Option 1: 'Loop in' connection to the existing 110kV Overhead Lines | Option 2: Underground connection to Charleville 110kV Substation |
|---|---|---|
| **Population & Human Health** | Option 1 will have less vehicular movements and road closures, so less disruptions to users of the public road network. | Option 2 is a longer route with more potential to impact on nearby residents due to road closures and vehicular movements associated with the underground connection. |
| **Biodiversity** | Shorter route contained within the site will have less impact on habitats. There are also no water crossings required for Option 1. | Option 2 has more potential effects due to the longer distance from the Site, and more watercourse crossings, in particular the Rathnacally stream, which is hydrologically connected to the Blackwater River (Cork/Waterford) SAC. |
| **Soils & Geology** | Shorter cable route will have a smaller footprint and therefore a smaller potential to impact soils and geology as the excavation volumes will be reduced. | Longer route with cable trenches have a larger footprint and have a greater potential to impact soils and geology as the excavation volumes will be greater. |
| **Hydrology & Hydrogeology** | There is no water crossings required for Option 1. | There are 4 watercourse crossings required for Option 2 with one of these being hydrologically linked to an SAC and as such there is greater potential for effects. |

| Criteria | Option 1: 'Loop in' connection to the existing 110kV Overhead Lines | Option 2: Underground connection to Charleville 110kV Substation |
|---|---|---|
| **Air & Climate** | Option 1 will have less vehicular movements and less dust emissions due to the smaller excavation footprint. | There will be higher carbon emissions for Option 2 due to the removal of tarmac and re-installation of road surface, as well as the use of larger amount of plastic ducting. There will also be more vehicle movements and more dust emissions due to a larger excavation footprint. |
| **Noise** | Option 1 will have noise generating activities for a shorter period of time with less receptors that could be affected. | Option 2 has a higher potential for construction noise for trench installation over a longer distance and timeframe during the construction phase and a greater number of potential receptors. |
| **Material Assets** | Option 1 will still generate waste from the excavation associated with the underground connection from the Substation to the end masts, however not to the extent of underground grid connection for Option 2. There will be no excavation of bitumen material requiring disposal with Option 1. | There will be a significant amount of road surface material contaminated by bitumen which will need to be disposed at a registered waste facility for underground cables in the public road network associated with Option 2. |
| **Landscape & Visual** | There is potential for greater visual impact for Option 1 during the operational phase due to overground masts required to 'loop' into the existing OHL. | Virtually no visual impact during operational phase when compared to Option 1, excluding the substation. |
| **Cultural Heritage** | Option 1 has an increased potential for impacts on unrecorded, subsurface archaeology as it runs through an undisturbed area of agricultural fields. | Option 2 has a slightly smaller potential for impacts on unrecorded archaeology as it runs through existing and proposed Access Tracks and publics roads. |
| **Traffic and Transport** | Option 1 will have very limited impact on traffic and transport. | Option 2, as it is a longer route along public roads, would have more impact due to road closures and traffic management requirements. In addition, an increase of removal of road surface material to a waste facility would increase traffic on roads. |

#### 3.6.5.4 Alternative Spoil Storage Sites

Spoil material will be generated from excavations to construct the infrastructure onsite. This will be mostly in the form of subsoils, that will be stored on-site as it is excavated. Generally, it is preferred to store spoil as close as possible to the site from where it was excavated. It is proposed to store spoil in five areas throughout the Site, with spoil storage areas proposed at T9, T3, T2, T1 and at the Substation. An alternative option would be to store the spoil at an off-site location.

A comparison of the potential environmental effects of storing spoil on-site in comparison to using an offsite storage is presented in **Table 3.8**.

**Table 3.8: Environmental Effects from Utilising On-Site Storage Compared to Off-Site storage**

| Criteria | Comment |
|---|---|
| **Population & Human Health (incl. Shadow Flicker)** | Less vehicular movements and less effect on human health from air emissions and traffic movements. |
| **Biodiversity** | Neutral |
| **Ornithology** | Neutral |
| **Soils & Geology** | Neutral |
| **Hydrology & Hydrogeology** | Increased risk of sediment laden runoff to watercourses. |
| **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. |

### 3.6.6 Alternative Turbine Delivery 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.

#### *3.6.6.1 Port of Entry*

The alternatives considered for the port of entry of wind turbines into Ireland for the proposed Project include Port of Galway and Shannon Foynes Port. Both Ports offer a lift-on lift-off procedure to facilitate importation of wind turbines. Shannon Foynes Port was selected as the port of entry for this project because it is located closer to the Site and with a number of the existing wind farms in the vicinity of the Site having used Shannon Foynes Port route and there are therefore only temporary accommodation requirements as detailed in **Chapter 17: Traffic and Transport** will be required to facilitate turbine deliveries on the route. Other ports were not considered as these two options are proven to have the required capabilities for turbine deliveries.

A comparison of the potential environmental effects of using Shannon Foynes Port in comparison to the Port of Galway option is presented in **Table 3.9**.

**Table 3.9: Environmental Effects from Utilising Foynes Port v Port of Galway**

| Criteria | Shannon Foynes Port | Combined Shannon Foynes Port & Port of Galway |
|---|---|---|
| **Population & Human Health** | Shorter route to site on a proven route. No significant effects on Population & Human Health. | The majority of the route is on the motorway network with a number of "nonproven" sections. No significant effects on Population & Human Health. |
| **Biodiversity** | Less works in third party lands off the road network. No significant effects on Biodiversity. | Potentially more work in third party lands off the road network around Galway City, however this has been successfully navigated by other projects. No significant effects on Biodiversity. |
| **Ornithology** | Less works in third party lands, in particular hedge and tree trimming on the road network. No significant effects on Ornithology. | More works in third party lands and potentially hedge and tree trimming on the road network. No significant effects on Ornithology. |
| **Soils & Geology** | Less works in third party lands off the road network. No significant | More works in third party lands. No significant effects on Soils & Geology. |

| Criteria | Shannon Foynes Port | Combined Shannon Foynes Port & Port of Galway |
|---|---|---|
| | effects on Soils & Geology. | |
| **Hydrology & Hydrogeology** | Neutral | Neutral |
| **Air & Climate** | Shorter journey times giving rise to lower air quality effects. | Longer journey times giving rise to an increase in air quality effects. |
| **Noise** | Less noise generated from vehicular movements over a shorter distance (c.55km). | More noise generated from vehicle movements over a longer distance (c.140km). Higher number of sensitive receptors with Galway and the outskirts of Limerick City on the route. |
| **Material Assets** | Neutral | Neutral |
| **Landscape & Visual** | Neutral | Neutral |
| **Cultural Heritage** | Neutral | Neutral |
| **Traffic and Transport** | Shorter vehicular movement on public roads over a shorter distance (c.55km). | Longer vehicular movement on public roads over a longer distance (c.140km). |

#### *3.6.6.2 Delivery to Site*

It is proposed that the turbine nacelles, tower hubs and rotor blades will be landed in Shannon Foynes Port, Co. Limerick. From there, they will be transported to the Site via the N69, N18, M20 and N20 to the upgraded Site Entrance 1. This route has proven suitable for the transport of turbine components for other wind farm developments in the area such as Rathnacally Wind Farm, Boolard Wind Farm, Castlepook Wind Farm and Knocknatallig Wind Farm. The transport analysis (as presented in **Chapter 17: Traffic and Transport**) shows that only relatively minor accommodation works will be required to accommodate the proposed turbines. However, the length of the blades proposed for the Project is longer than those of other wind farms that have used the route from the Shannon Foynes Port. It has been assessed that there may be an issue with the vertical alignment on the Ferrybridge for blade deliveries and therefore, the use of the Port of Galway has been considered for the delivery of the blade components only (if there is no option to use a 'Dolly' system to traverse the Ferrybridge). The difference in using the Shannon Foynes Port compared to a combination of Foynes and Foynes and Port of Galway is there would be slightly longer travel distance and a slight increase in air emissions associated with using the combined Shannon Foynes Port and Port of Galway.

### 3.6.7 ALTERNATIVE MITIGATION MEASURES

Mitigation by avoidance underpins the proposed Project. By avoiding the more ecologically sensitive areas of the Site as much as possible, the potential for environmental effects is reduced. As noted above, the Site layout avoided environmentally sensitive areas through the application of Site-specific constraints in the design development. The Site is not located in a designated site for nature conservation and, following the implementation of the habitat enhancement proposals, there will be a net gain in biodiversity on the Site as outlined in the Biodiversity Enhancement and Management Plan in **Appendix 6.2**.

The approach adopted, has taken environmental considerations into account early in the design process so that mitigation measures are integrated into the fundamental design. The best practice design and mitigation measures set out in this EIAR will contribute to reducing risks and have been designed to break the pathway between the Site and any identified sensitive receptors.

## 3.7 CONCLUSION

A description of the reasonable alternatives in terms of project design, technology, location, size and scale which are relevant to the proposed Project and its specific characteristics [maximum 54MW output, 9 no. turbine with a tip height of 170m, a hub height of 95m and a rotor diameter of 150m – large scale wind farm], has been provided. An indication of the main reasons for selecting the chosen options, including a comparison of the environmental effects has also 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 Project given consideration of the main criteria of distances from dwellings, wind speeds, potential environmental effects and use of an existing, optimal Grid Connection.