Environmental Impact Assessment Report (EIAR)

Ballydermot Wind Farm, Co. Offaly & Co. Kildare

Chapter 3 – Site Selection and Reasonable Alternatives

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GLOSSARY OF TERMS

Term	Definition
Areas Deemed Open for Consideration for Wind Energy Developments	Areas that are characterised in the Offaly County Development Plan as *'open for consideration for wind energy development as these areas are characterised by low housing densities, do not conflict with European or National designated sites and have the ability by virtue of their landscape characteristics to absorb wind farm developments'*
Acceptable in Principle	Areas that are characterised in the Kildare County Development Plan as '*the preferred area for wind energy development characterised by a robust landscape, a low housing density, adequate windspeeds and proximity to the existing electricity transmission and distribution grid, while having no significant conflicts with natural heritage designations.'*
Do Nothing Alternative	The environment of the site and its environs should the Proposed Project not be developed
Natural Heritage Area	The basic designation for wildlife is the Natural Heritage Area. This is an area considered important for the habitats present, or which holds species of plants and animals whose habitat needs protection.
Proposed Natural Heritage Area	Wildlife protection areas that have not been statutorily proposed or designated. These sites are of significance for wildlife and habitats and cover approximately 65,000ha across Ireland. Designation will proceed on a phased basis over the coming years.
Special Area of Conservation	Prime wildlife conservation areas in Ireland, considered to be important on a European as well as an Irish level. The legal basis on which SACs are selected and designated is the EU Habitats Directive, transposed into Irish law by the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011), as amended.
Shadow Flicker	A phenomenon when rotating wind turbine blades cast moving shadows over a narrow opening causing a rapidly alternating flickering light intensity
Special Protection Area	Protected sites designated under the EU Birds Directive (2009/147/EC) to conserve rare, vulnerable, and migratory bird species, along with their wetland habitats in Ireland.

GLOSSARY OF ACRONYMS

ACP	An Coimisiún Pleanála
BCI	Butterfly Conservation Ireland
BMP	Biodiversity Management Plan
BnM	Bord na Móna
CAP	Climate Action Plan
CDP	County Development Plan
CRA	Collision Risk Assessment
EIAR	Environmental Impact Assessment Report
FoS	Factor of Safety
GIS	Geographical Information Systems
GIS	Gas-Insulated Substation
GW	Gigawatt
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicle
IFI	Inland Fisheries Ireland
IFP	Instrument Flight Procedure
KCDP	Kildare County Development Plan
KERs	Key Ecological Receptors
KORs	Key Ornithological Receptors
LFL	Limted Felling Licence
LFTA	Low Flying Training Area
MW	Megawatt
NPF	National Planning Framework
NPWS	National Parks and Wildlife Service
OCDP	Offaly County Development Plan
OHL	Overhead line

PCAS	Peatland Climate Action Scheme
pNHA	Proposed Natural Heritage Area
PSRA	Peat Stability Risk Assessment
RVIA	Residential Visual Impact Appraisal
SEAI	Sustainable Energy Authority of Ireland
SMR	Sites and Monuments Record
SPA	Special Protection Area
VP	Viewpoints
WEDG	Wind Energy Development Guidelines
ZTV	Zone of theoretical visibility

3. SITE SELECTION AND REASONABLE ALTERNATIVES

3.1 Introduction

Article 5(1)(d) of Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (codification) as amended by Directive 2014/52/EU (the EIA Directive) requires that the Environmental Impact Assessment Report (EIAR) prepared by the developer contains *"a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment."*

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

Annex IV of the EIA Directive states that the information provided in an EIAR should include a *"description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects."*

As detailed in Section 1.1.1 in Chapter 1, for the purposes of this EIAR, the various project components are described using the following references: 'the Proposed Project', 'Proposed Enhancement Areas', 'Proposed Construction Haul Routes', 'Proposed Turbine Delivery Route', 'Project Site', 'Proposed Wind Farm', 'Proposed Turbines', 'Proposed Grid Connection', 'Proposed Onsite Substation', and the 'Proposed Offsite Substation'.

This chapter of the EIAR contains a description of the reasonable alternatives that were studied by the developer and discipline leads, which are relevant to the Proposed Project and its specific characteristics, in terms of site location and other renewable energy technologies as well as site layout incorporating size and scale of the Proposed Project, connection to the national grid and transport route options to the site. This section also outlines the design considerations in relation to the Proposed Wind Farm, the Proposed Grid Connection, the Proposed Enhancement Areas, and the Proposed Construction Haul Routes. It provides an explanation of the main reasons for selecting the chosen option, including a comparison of the environmental effects.

The consideration of alternatives is an effective means of avoiding environmental impacts. As set out in the '*Guidelines on The Information to be Contained in Environmental Impact Assessment Reports' (Environmental Protection Agency, 2022),* the presentation and consideration of reasonable alternatives investigated is an important part of the overall EIA process.

Hierarchy

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

Non-Environmental Factors

EIA is focused on the potential significant environmental effects of the Proposed Project that influence consideration of alternatives. However, other non-environmental factors may have equal or overriding importance to the developer of a project, for example project economics, land availability, engineering feasibility or planning considerations.

Site-Specific Issues

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

3.2 Consideration of Reasonable Alternatives

3.2.1 Methodology

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

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

There is limited European and National guidance on what constitutes a 'reasonable alternative' however EU guidance (EU, 2017) states that reasonable alternatives "*must be relevant to the proposed project and its specific characteristics, and resources should only be spent assessing these alternatives".*

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

The EPA Guidelines state that "*It is generally sufficient to provide a broad description of each main alternative and the key issues associated with each, showing how environmental considerations were taken into account in deciding on the selected option. A detailed assessment (or 'mini-EIA') of each alternative is not required.*"

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

- 'Do Nothing' Alternative
- Alternative Site Locations
- Alternative Renewable Energy Technologies
- Alternative Project Design Options
    - Alternative Turbine Numbers and Model;
    - Alternative Turbine Layout and Design;
    - Alternative Substation and Grid Connection Options
    - Alternative Enhancement Areas
    - Alternative Met Mast Locations
    - Alternative Design of Ancillary Structures
- Alternative Delivery/Haul Routes and Access Options;

- Alternative Construction/Operational Entrance Options
- Alternative Construction Haul Routes
- Alternative Turbine Component Delivery Routes

- Alternative Mitigation Measures.

Each of these is addressed in the following sections.

When considering the Proposed Project, given the intrinsic link between layout and design, the two will be considered together in this chapter.

3.2.2 'Do-Nothing' Alternative

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

An alternative to developing a renewable energy project at the Project Site would be to retain the Project Site in its current state, with no changes to existing land-use practices (the 'Do-Nothing' Alternative).

Under this alternative, the Proposed Wind Farm site, i.e., the area encompassing the Proposed Wind Farm, Proposed Enhancement Areas, Proposed Onsite Substation, and 0.5km of the Proposed Grid Connection underground electrical cable route, would continue to be managed in accordance with IPC Licence (P0503-01). This would include the continuation of ongoing decommissioning activities, site management, and environmental monitoring. Furthermore, implementation of the draft Cutaway Decommission and Rehabilitation Plan (hereafter referred to as the Draft Rehabilitation Plan), included as part of this EIAR, as detailed in Section 4.6.7 of Chapter 4, and required under the IPC Licence, and maintenance and monitoring of completed Peatland Climate Action Scheme (PCAS) activities within Lodge Bog. These land uses and activities will also continue should the Proposed Project proceed, in accordance with Bord na Móna's (BnM's) IPC Licence obligations.

For the remainder of the Project Site – comprising the remaining 12.6km of the Proposed Grid Connection underground electrical cable route, the Proposed Offsite Substation, and the Proposed Turbine Delivery Route accommodation works – the Do-Nothing Scenario would result in no changes to current land-use practices. These areas would continue to function as public road corridor, operational renewable energy, and private agricultural land.

In implementing the 'Do-Nothing' alternative, however, the opportunity to capture a significant part of Co. Offaly's and Co. Kildare's renewable energy resource would be missed, as would the opportunity to contribute to meeting Government and EU 2030 targets for the production and consumption of electricity from renewable resources and the reduction of greenhouse gas emissions. The opportunity to generate local employment, development contributions, and rates would also be forgone. In addition, the proposed amenity routes and associated carparks would not be constructed as part of the Proposed Project and therefore this recreational opportunity would be lost.

As such, on the basis of the positive environmental effects arising from the Proposed Project when compared to the 'Do-Nothing' Alternative, the 'Do-Nothing' Scenario was not the chosen option. The existing land uses and activities can and will continue in conjunction with the Proposed Project. A comparison of the potential environmental effects of the 'Do-Nothing' alternative when compared against the chosen option of developing a renewable wind energy project at the Project Site are presented in Table 3-1 below.

Table 3-1 Comparison of environmental effects of the 'Do-Nothing' alternative with the Proposed Project

Environmental Consideration	Do-Nothing Alternative (existing land uses continue)	Chosen Option of developing a wind energy development
Population & Human Health (incl. Shadow Flicker)	No increase in local employment and no long-term financial contributions towards the local community. No potential for shadow flicker and noise to affect sensitive receptors. No potential for effects on visual amenity due to the construction and operation of turbines. No potential to supply an estimated 257,390 Irish households with clean renewable electricity No potential to provide the local community with amenity walking/cycling trails and equestrian track.	Approximately 200-250 jobs during the construction phase and 6 - 8 jobs during operational and maintenance phases could be created as a result of the Proposed Project. Based on the assessment and mitigation measures detailed in Chapter 5 Population & Human Health, there will be no significant effects related to shadow flicker during the operational phase. The Proposed Project will also serve to provide dedicated amenity walking/cycling trails and equestrian track for the local community and wider public. Amenity tracks will provide a greater variety of walking loops and connectivity to local roads, offsite existing amenities and allow local access to the Proposed Wind Farm. This will have no significant effects on amenity; the Proposed Project will have a positive, slight, long-term impact on amenity and tourism. As detailed in the assessment in Chapter 11, the Proposed Project will have a long-term significant positive effect on climate during the operational phase. As detailed in Chapter 12, Noise and Vibration will have no significant effects on sensitive receptors during the construction and operational phase. As detailed in Chapter 13 Landscape and Visual, the landscape type and character of the area where the Proposed Turbines are sited comprises peatland landscape types of moderate sensitivity and can effectively accommodate wind energy development. Of the 27 no. viewpoints (VPs) assessed 3 no. were deemed not significant, 12 no. were deemed slight, 8 no. were deemed moderate, and 4 no. were deemed significant. The number of receptors experiencing these effects is very low as the landscape surrounding the proposed turbines has a low population density. Visual effects will decrease with distance from the proposed turbines. The Proposed Turbine locations adhere to the recommended 500m setback distance in the '*Wind Energy Development Guidelines for Planning Authorities'* (DoEHLG, 2006) (hereafter referred to as the 'WEDG 2006') and also the 4 times tip height set-back distance set out in the '*Draft Wind Energy Development Guidelines'* (December 2019) (hereafter referred

Environmental Consideration	Do-Nothing Alternative (existing land uses continue)	Chosen Option of developing a wind energy development
		to as the 'Draft WEDG 2019') for the purpose of protecting visual amenity and ensuring no significant effects arise from noise and shadow flicker.
Biodiversity & Birds	No habitat loss. No potential for collision risk for birds and bats. No potential biodiversity enhancement measures would be put in place. However, as part of the Applicant's statutory obligations under IPC licence requirements, the Draft Rehabilitation Plan will continue to be implemented for the Proposed Wind Farm site.	Irrespective of the consenting or construction of the Proposed Project, the measures outlined in the Draft Rehabilitation Plan will be implemented by the Applicant in agreement with the EPA, per the Applicant's IPC Licence Obligations. As detailed in Chapter 6 Biodiversity, the Proposed Project has been designed to avoid or mitigate impacts on biodiversity including bats and downstream aquatic receptors. The Proposed Project includes a Biodiversity Management Plan (BMP) proposal providing a local boost to biodiversity, birds, and water quality. Please see Appendix 6-5 for details. With regard to collision risk, as detailed in the Bat Report in Appendix 6-2 of this EIAR, site-level collision risk for high collision risk bat species with Proposed Turbines was typically Low to Medium. Therefore, there will be no significant effects on bats. As detailed in Chapter 7 Birds, the Proposed Project has been designed to avoid or mitigate impacts on ornithological receptors. As detailed in the Collision Risk Assessment (CRA) in Appendix 7-6, there will be significant effects on wintering Golden Plover and breeding Lapwing due to collision risk prior to mitigation being applied. No significant effects will occur post-mitigation.
Land, Soils & Geology	No excavation of peat and spoil.	As detailed in the assessment in Chapter 8, peat, topsoil and subsoil excavation volumes will be managed within the Proposed Wind Farm site, and the residual effects on peat, topsoil and subsoil are not significant. There will be no net loss of peat, topsoil or subsoil as a result of the Proposed Project. Peat, topsoil, and subsoil will be relocated within the site. Geotechnical investigations followed by careful design will result in no significant environmental impacts. The peat and spoil management proposals discussed in Section 4.4.1.7 of Chapter 4 sets out the optimal treatment for peat and spoil excavated/ generated on site without creating significant impacts for biodiversity, hydrology, land use, etc.

Environmental Consideration	Do-Nothing Alternative (existing land uses continue)	Chosen Option of developing a wind energy development
Geotechnical/Peat Stability	No potential for peat slippage. The Project Site is located on a relatively flat-lying site. The flat topography/nature of the terrain on Project Site reflects the low risk of peat failure.	As detailed in Appendix 8-1, the findings of the Peat Stability Risk Assessment (PSRA) showed that the Project Site has an acceptable margin of safety and is suitable for the development of the Proposed Project.
Water	Neutral - minor maintenance and minor repairs to the drainage network (where required) are part of IPC Licence requirements.	As detailed in the assessment in Chapter 9, no significant effects on surface water or groundwater quality will occur.
Air Quality	Slight improvement on air quality due to the implementation of the Draft Rehabilitation Plans.	As detailed in Chapter 10, the Proposed Project will have a long-term, significant, positive effect on air quality during the operational phase
Climate	The implementation of the Draft Rehabilitation Plans will aid in achieving climate targets relating to land-use and peatland restoration. However, the opportunity would be lost for a reduction of greenhouse gases and achieving the renewable energy targets set out in the national and local climate action plans.	As detailed in the assessment in Chapter 11 Climate, 146,857 tonnes of carbon dioxide per annum will be displaced from traditional carbon-based electricity generation as a result of the operation of the Proposed Project. Over the proposed 35-year lifetime of the Proposed Project, therefore, 5,139,995 tonnes of carbon dioxide will be displaced from traditional carbon-based electricity generation. The addition of an estimated 322MW clean energy to the national grid will be a positive contribution to the Ireland's renewable energy targets set out in CAP25.
Noise & Vibration	No potential for noise and vibration impacts on nearby sensitive receptors.	Based on the assessment detailed in Chapter 12 Noise and the mitigation measures proposed, there will be no significant effects on sensitive receptors due to noise and vibration levels from the Proposed Project during the construction and operational phases.
Landscape & Visual	Landscape and visual impacts avoided. The key objective of the Draft Rehabilitation Plans is environmental stabilisation via rewetting of cutover peatland to establish a naturally functioning wetland and encourage plants that prefer wetter conditions, such as Bog Cotton. With the implementation of the Draft Rehabilitation Plan, there will be a positive increase in landscape and visual impact.	As detailed in Chapter 13 Landscape and Visual, the landscape type and character of the area where the Proposed Turbines are sited comprises peatland landscape types of moderate sensitivity and can effectively accommodate wind energy development. Of the 27 no. VPs assessed 3 no. were deemed not significant, 12 no. were deemed slight, 8 no. were deemed moderate, and 4 no. were deemed significant. The number of receptors experiencing these effects is very low as the landscape surrounding the proposed turbines has a low population density. Visual effects will decrease with distance from the proposed turbines. The Draft Rehabilitation Plan will be implemented whether the Proposed Project proceeds or not. With the implementation of the

Environmental Consideration	Do-Nothing Alternative (existing land uses continue)	Chosen Option of developing a wind energy development
		Draft Rehabilitation Plan, there will be a positive increase in landscape and visual impact.
Cultural Heritage	No potential for impacts on unrecorded, subsurface archaeology.	As detailed in Chapter 14 Cultural Heritage, there will be no significant direct or indirect effects on known or unknown archaeology and cultural heritage during the construction, and decommissioning phases.
Material Assets – Traffic and Transport	No potential for impacts on the public road network due to no material transport to the Project Site along the Proposed Construction Haul Routes. The routes in which the Proposed Construction Haul Routes are located are currently utilised by local appropriately authorised quarries in the area and would continue to be used as such irrespective of the Proposed Project.	As detailed in Section 15.1 of Chapter 15 Material Assets, there will be no significant effects on traffic and transport during the construction, operational, and decommissioning phases of the Proposed Project. A detailed Traffic Management Plan (Appendix 15-2) incorporating all the mitigation measures will be agreed with the roads authority prior to construction works commencing on site.
Material Assets – Telecommunications and Other Material Assets	No potential for impacts on telecommunications links.	As detailed in 15.3.5.3 during the operational phase there will be a positive significant effect on electricity due to the displacement from traditional carbon-based electricity generation. As detailed in Section 15.2 and 15.3 of Chapter 15, there will be no negative significant effects post-mitigation on telecommunications and other material assets during the construction, operational, and decommissioning phases of the Proposed Project.
Aviation	No potential for impacts on aviation.	As detailed in Chapter 16, there will be a significant negative effect on the Edenderry Low Flying Training Area (LFTA). The Applicant is open to engaging with the DoD in relation to an agreement to move the low flying area to an alternative suitable area; should a suitable area be identified and agreed there will be no significant effect on LFTAs due to the Proposed Project. Further information on the Edenderry LFTA is detailed in Section 16.7.2.2 of Chapter 16. No other significant effects will occur on aviation during the construction, operational, and decommissioning phases of the Proposed Project.
Major Accidents and Natural Disasters	No potential to be affected by or to cause major accidents or natural disasters.	As demonstrated in Chapter 17, the risk of a major accident and/or disaster during the construction of the Proposed Project is considered 'low' in accordance with the '*Guide to Risk Assessment in Major Emergency Management*' (DoEHLG, 2010). The highest risk scenarios to the Proposed Project (i.e., contamination, fire/explosion, and

Environmental Consideration	Do-Nothing Alternative (existing land uses continue)	Chosen Option of developing a wind energy development
		aviation) are considered to be unlikely to occur at any phase of the Proposed Project. The Proposed Project will be designed and built in accordance with current best practice and, as such, mitigation against the risk of major accidents and/or disasters will be embedded through the design. With the implementation of all mitigation and monitoring measures detailed in the EIAR, there will be no significant residual effects associated with the construction, operation and decommissioning of the Proposed Project.

For the reasons set out above, the proposal for a wind energy development at the Project Site was progressed over the 'Do-Nothing' Alternative, this decision is cognisant of the potential environmental effects identified, both negative and positive arising from the Proposed Project. By progressing the Proposed Wind Farm there is an opportunity to create employment and investment in the local area and to capture the available renewable energy resource within Co. Offaly and Co. Kildare, thus contributing to meeting national and international climate targets.

3.2.3 Alternative Site Locations

The Applicant owns circa 80,000 hectares of peatlands, primarily in the midlands of Ireland. An assessment of potential future uses of this landbank was published by the Applicant in 2011 in a document entitled '*Strategic Framework for the Future Use of Peatlands'*. This report clearly identified the potential for the development of renewable energy (in particular wind energy) and other developments on the Applicant's peatlands.

BnM Brown to Green 2016 – 2021 strategy was officially launched around 2018, as part of a major shift away from peat-based operations toward renewable energy, climate solutions, and sustainable resource management. BnM is now fully focused on renewable energy generation and the development of other low carbon enterprises. One of the key outputs of this launch was BnM's official decarbonisation strategy. Key points of the company's decarbonisation plan include:

- 75% of energy generated by the company will be renewable by 2020, up from 10% in 2010.
- Development of new businesses to support the low carbon economy in development. Identified potential to create 400-500 jobs across the Midlands in the medium term.
- Accelerated development of renewable energy assets. Providing up to 2GW of generating assets by 2030.

Steep increase in the supply of greenhouse-gas neutral biomass replacing peat to the three Midlands power stations.

The Applicant's peatlands offer many advantages for the development of renewable energy, including:

- Industrial brownfield sites suitable for redevelopment;
- Of significant scale and present in large blocks;
- Open, unenclosed landscapes with good wind characteristics;
- Linked by rail or road passageways, suitable for cable connection;
- Generally flat and well drained, with minimal dangers of land slippage, and;
- Proven delivery of this type of development, as demonstrated by BnM's Bruckana, Mountlucas, Cloncreen, Derrinlough and Oweninny Wind Farms.

The Project Ireland 2040 National Planning Framework (NPF) identified a range of key future planning and development and place-making policy priorities for the Eastern and Midland Region that includes:

> *"Harnessing the potential of the region in renewable energy terms across the technological spectrum from wind and solar to biomass and, where applicable, wave energy, focusing in particular on the extensive tracts of publicly owned peat extraction areas in order to enable a managed transition of the local economies of such areas in gaining the economic benefits of greener energy."*

The first revision of the NPF[1], published in April 2025, updates the key future planning and development and place-making policy priorities for the Eastern and Midland Region, including:

> *"Developing the potential of the region in renewable energy terms, in accordance with the capacity allocation targets set out in Chapter 9: Climate Transition and Our Environment, across the technological spectrum from wind and solar to biomass and, where applicable, wave energy, focusing in particular on the extensive tracts of publicly owned peat extraction areas in order to support a managed just transition of local economies to greener energy"*

Consequently, when considering suitable locations for the Proposed Project in 2019, the assessment was confined to lands within the Applicant's landholding only, as these lands have been identified in a national and regional context as being suitable for this type of development. An examination of sites outside of this landholding was not included as part of the process.

The assessment carried out for the determination of a suitable location for the Proposed Project was a two-stage process. The first stage comprised the identification of a number of candidate sites while the second stage comprised a site-specific assessment. Each of these stages are described in the following sections.

3.2.3.1 Selection of Candidate Sites

In order to identify candidate sites, i.e., sites considered suitable for wind energy development, the Applicant conducted a technical review of peatlands which are either cut away or cutover within their landbank. This involved desk studies and on-site surveys of the landbank. Known constraints were then applied across the landbank. The constraints applied were derived from various industry and regulatory guidelines, available Geographical Information Systems (GIS) datasets and on-site surveys and included the following:

- Planning Policy Context;
- Proximity to Sensitive Receptors;
- Peat Depths;
- Suitable wind speeds;
- Proximity to the national electricity grid; and
- Proximity to National and European Designated sites and onsite Environmental Sensitivities.

The assessment process was used to generate a list of potential sites for further consideration. Ten sites were identified as having a higher potential for wind energy development and these were then brought forward for site-specific assessment, as detailed below and in Table 3-3.

3.2.3.2 Site-Specific Assessments

The aim of the site-specific assessments was to gauge the sites with the best potential to deliver a successful wind farm project by the end of this decade, i.e., 2025 - 2030. The goal was to select a project

[1] https://cdn.npf.ie/wp-content/uploads/National-Planning-Framework-First-Revision-April-2025-1.pdf

to bring forward, for which preliminary engineering designs and a planning application could be prepared.

The first stage comprised the identification of a number of candidate sites via desk studies and on-site surveys of the landbank. Known constraints, derived from various industry and regulatory guidelines, available GIS datasets and on-site surveys (carried out as part of the peat extraction activity), were then applied to the dataset, including those listed in Section 3.2.3.1 above.

The second stage of the assessment was used to select the sites with the best potential to deliver a successful wind farm project by 2030 to be further developed. This site-specific assessment was guided by the 2013 '*Methodology for Local Authority Renewable Energy Strategies*' report from the Sustainable Energy Authority of Ireland (SEAI) and informed by consultation with the Applicant's Works Management, Engineering, Construction, Ecology, Land and Property, and Planning teams.

Key criteria were selected for the site-specific assessment, which not only covered the broad range of issues which can arise from wind farm development but also allowed for direct comparison between candidate sites to determine their relative suitability. The site-specific selection criteria and an outline of the basis for assessment for each criterion are listed in Table 3-2 below. To facilitate the selection process, greater emphasis was placed on certain criteria viewed as critical to site suitability, including environmental sensitivity, grid access/capacity, county development plans and zoning, and proximity to houses.

The criteria can be regarded as either a constraint to the Proposed Project or a facilitator for the Proposed Project. For example, the level of flooding at the site may reduce the available 'buildable' area or the lack of flooding may highlight the suitability of the site. The environmental effect of significant flooding may arise due to a requirement for deeper and more extensive drainage leading to potential downstream surface water impacts. In the case of the Applicant's lands, the existing onsite drainage is a facilitator to the project as surface water is already managed in accordance with the EPA-administrated IPC licence.

3.2.3.3 Site Selection Results

The findings of the site-specific assessment process, which included a comparison of the site selection criteria and potential environmental effects is provided in Section 3.2.3.3.1 and Table 3-3 below.

Of the sites assessed, Ballydermot Bog, and surrounding bogs comprising part of the Allen Bog Group, were selected as a site with relatively low potential for environmental effects similar to a number of the other sites on the list that met the relevant criteria. Due to, for instance, the low landscape sensitivity, and compatibility with national and regional renewable energy objectives, it was deemed that the Project Site should be progressed for detailed assessment and planning consideration.

The process described in the preceding paragraphs is not a one-off assessment of the entire BnM landholding in terms of its suitability for renewable energy developments. The site selection process is revisited in its entirety for each individual project and the criteria updated to suit the technology type proposed and to take account of any changes that have occurred (i.e., policy, legislative, environmental, etc.) since the previous site selection process was conducted.

The application of the above criteria resulted in the selection of a number of BnM Bogs for candidate wind farm sites, including the Project Site at Ballydermot and adjacent townlands, which is the subject of the present application.

Table 3-2: Site-specific Selection Criteria and Basis for Assessment

Criterion	Basis for Assessment	Potential Environmental Effect
Grid Access/ Capacity	Grid Access/Capacity means the potential of the National Grid to accommodate future projects on the network. The proximity of a project to suitable grid nodes (i.e., those with spare capacity) should facilitate the selection of a project for a viable grid connection offer.	**Direct:** Land, Soil and Geology, Water, Biodiversity. **Indirect:** Noise and Vibration, Population and Human Health.
Wind Resource Assessment	The available wind resource (i.e., wind speed) directly translates into how much electrical output is available from the Site.	**Direct:** Air Quality, Climate. **Indirect:** Population Human Health, Air Quality, Climate.
County Development Plans (CDP) and Zoning	County Development Plans typically indicate the areas of a county which are deemed preferred, open to consideration and not suitable for wind farm development.	**Direct:** Landscape and Visual, Cultural Heritage, Biodiversity. **Indirect:** Major Accidents.
Proximity to Houses	Proximity to houses refers to how close the proposed wind turbines are to sensitive receptors.	**Direct:** Population and Human Health, Noise and Vibration, Shadow Flicker. **Indirect:** Landscape and Visual.
Population Density	Population density refers to the density of housing and population in the surrounding environs to the Project Site.	**Direct:** Population and Human Health, Noise and Vibration, Shadow Flicker. **Indirect:** Landscape and Visual.
Environmental Sensitivity	Environmental Sensitivity is the ecological sensitivity of the Project Site based on proximity to sensitive areas within or around the Site.	**Direct:** Biodiversity, Birds, Land Soils and Geology, Climate. **Indirect:** Water, Major Accidents.
Landscape Capacity/ Cumulative Impact	This refers to the landscape's capacity to absorb wind farm developments.	**Direct:** Landscape and Visual. **Indirect:** Cultural Heritage.

Criterion	Basis for Assessment	Potential Environmental Effect
Aviation	Airspace control and use to be considered. For the assessment, the criterion examines proximity of the site to local and regional airports (including Casement Aerodrome), proximity to National Motorway network, parachute zone, Military Operating Areas, etc.	**Direct:** Material Assets (Telecommunications and Electromagnetic Frequency), Aviation, Major Accidents.
Land Use	Internal BnM consideration relating to alternative uses for each bog.	**Direct:** Water Land, Soils and Geology, Biodiversity, Birds, Climate, Cultural Heritage, Major Accidents.
Communications Infrastructure	Telecoms masts and signals in the vicinity and across the sites to be considered.	**Direct:** Material Assets (Telecommunications and Electromagnetic Frequency, Aviation.
Flood Plain Analysis	Flood Plain Analysis assesses the wind farm's location in terms of historical flooding data. It also considers if the site is pumped, or gravity drained.	**Direct:** Water, Major Accidents. **Indirect:** Material Assets (Traffic and Transportation), Major Accidents.
Supporting Infrastructure	Proximity to national and regional road network sites with better road access require less modifications or upgrade to the local infrastructure to facilitate construction or delivery of turbine components to site.	**Direct:** Material Assets (Traffic and Transportation). **Indirect:** Noise and Vibration, Air Quality, and Climate.

Table 3-3: Site-specific Selection Criteria findings and associated potential effects

Candidate Sites	Grid Access/ Capacity	Wind Resource Assessment	CDP and Zoning	Proximity to Houses	Environmental Sensitivity	Landscape Capacity/ Cumulative Impact	Aviation	Land Use	Communications Infrastructure	Flood Plain Analysis	Supporting Infrastructure
Proposed Ballydermot Wind Farm (the Proposed Project)	220kV (Maynooth-Dunstown) grid network runs within the vicinity of the Project Site. Potential available capacity.	The Irish Wind Atlas outlines that wind speeds in midlands bog groups are typically between 7 – 8 m/s. Therefore, this criterion is neutral across all sites.	The Project Site falls across the administrative area of Offaly County Council and Kildare County Council and therefore, is subject to the planning policies and objectives set out in the Offaly County Development Plan 2021-2027 (OCDP) and Kildare County Development Plan 2023-2029 (KCDP). All Proposed Turbines are within an area deemed '*Open for Consideration*' in the OCDP and '*Open for Consideration'* within the KCDP.	This criterion is neutral with respect to the outlined environmental effects as BnM wind farms are always designed for as per the recommended setbacks in the WEDG 2006 and the Draft WEDG 2019. The population density of the Population Study Area in 2022 is 64.43 persons per square kilometre, as described in Section 5.3.3 of Chapter 5 Population and Human Health of this EIAR. This is considerably lower than the national population density of 73.27 persons per square kilometre and the population density of Co. Kildare, recorded at 146.26 persons per square kilometre. The population density of the Population Study Area is greater than the population density of Co. Offaly in 2022, recorded at 41.55 persons per square kilometre. The siting of the Proposed Turbines achieves the recommended setbacks in the WEDG 2006 and the Draft WEDG 2019. The nearest settlement to the Proposed Turbines is Edenderry, located approximately 2.2km northwest of the nearest Proposed Turbine (T32).	The Proposed Grid Connection underground electrical cable route passes through the Ballynafagh Lake SAC, this element of the Proposed Project is confined to the public road corridor of the R414 regional road which traverses through the SAC. The Proposed Grid Connection underground electrical cable route passes through the Grand Canal proposed Natural Heritage Area (pNHA) this element of the Proposed Project will involve Horizontal Directional Drilling (HDD) under the Grand Canal and has been appropriately assessed within this EIAR. There is a low density of Natura sites in the wider area, with mainly low value habitat present on the Project Site.	The permitted Clonarrow Wind Farm (PL Ref: 2560189) is granted and located 12.9km west of the Proposed Turbines at its closest point (T22). The permitted Dernacart Wind Farm (PL Red: 2078, PL11.310312) is granted and located 22.3km southwest of the Proposed Turbines at its closest point (T13). The existing Cloncreen Wind Farm (PL Ref: PA19.PA0047) is operational and located 2.85km west of the Proposed Turbines at its closets point (T22). The existing Yellow River Wind Farm (PL Ref: PL19.PA0032, PM19.312876) is operational and located 12.1km northwest of the Proposed Turbines at its closest point (T32). The existing Cushaling Wind Farm (PL Ref: 19.306924 (OCC: 19/606) & PL09.306748 (KCC: 19/1323)) is operational and located 0.7km south from the nearest Proposed Turbine (T26). The existing Mountlucas Wind Farm (PL Ref: PL2/09/453; PL2/11/125; PL2/11/232) is operational and located 10.3km west of the Proposed Turbines at its closest point (T22). The existing Moanvane Wind Farm (PL Ref: 301619-18 (17/335)) is operational and located 13.8km southwest of the Proposed Turbines at its closest point (T13). The proposed Ballinla Wind Farm (PL Ref: PAX19.323579) is currently under consideration by An Coimisiún Pleanála (ACP) and is located 7.2km west of the Proposed Turbines at its closest point (T22). The proposed Derrynadarragh Wind Farm (PL Ref: PAX09.324055) is currently under consideration by ACP and is located 7.6km south of the Proposed Turbines at its closest point (T14).	The eastern part of the Project Site is within 5.5km of Clonbullogue Airfield. Casement Aerodrome is over 30km east of the Proposed Wind Farm.	Significant areas (>75%) of the Project Site have low levels of peat.	There are 28-no. links crossing the Project Site; only 3 no. links have potential to be impacted by the Proposed Project.	The Project Site is pumped and has no recurring or historic flood incidents identified from the Office of Public Works (OPW)'s Past Flood Events Map The hardstand footprint of Proposed Turbine T10, T22, T38, T42, T45 and T46, along with portions of the proposed new roads and the upgrade of an existing crossing between Proposed Turbine T28 and T42 and a new watercourse crossing located between T22 and T26 are located within the 100-year and 1,000-year fluvial flood zones. There will be no increase in the upstream or downstream flood risk.	The Project Site has direct access to the and R414 and R401, along with a number of local roads surrounding the Project Site.

Candidate Sites	Grid Access/ Capacity	Wind Resource Assessment	CDP and Zoning	Proximity to Houses	Environmental Sensitivity	Landscape Capacity/ Cumulative Impact	Aviation	Land Use	Communications Infrastructure	Flood Plain Analysis	Supporting Infrastructure
						The permitted Ballivor Wind Farm (PL Ref: PA25M.316212) is located 21.3km north of the Proposed Turbines at its closest point (T32). The proposed Drehid Wind Farm (PL Ref: PA09.322845, VA09.322843) is currently under consideration by ACP and is located 7.4km northeast of the Proposed Turbines at its closest point (T46). The proposed Kilberry Wind Farm has been referenced within the public domain. No detail on turbine dimensions or location is yet available for assessment. The proposed Cushina Wind Farm (PL Ref: PC19.323296) is currently undergoing pre-app consultation with ACP. No detail on turbine dimensions or location is yet available for assessment. The proposed Garryhinch Wind Farm (PL Ref: PC19.315157) is currently undergoing pre-app consultation with ACP and is located 20km southeast of the Proposed Turbines at its closest point (T3).					
Clorhane (Blackwater)	Site is in close proximity to existing grid infrastructure at Shannonbridge with good available grid capacity. A number of 110kV lines run close to the site.	The Irish Wind Atlas outlines that wind speeds in midlands bog groups are typically between 7 – 8 m/s. Therefore, this criterion is neutral across all sites.	Partially in preferred area in Offaly County Development Plan 2021-2027, partially within buffered area from Clonmacnoise.	This criterion is neutral with respect to the outlined environmental effects as BnM wind farms are designed as per the recommended setbacks in the WEDG 2006 and the Draft WEDG 2019.	No Natura areas within the site, high density of Natura sites in the local area, close proximity to the River Shannon, large areas of high value habitat within the site.	There are 2 no. wind farm sites (either constructed, consented, or proposed) within 25km of the proposed turbines.	The site is at a significant distance from local and regional airports as well as the main motorway network.	Significant areas (>75%) of the site have low levels of peat. There is a low level of commercial forestry at the site and also some areas of biodiversity.	There are a number of masts located in Shannonbridge.	The site is pumped. It has 7 recognised flood points in the local area.	The site has access to the R357 and R444 regional roads.
Coolnamona	110kV network runs to the north of Coolnamona bog but there is poor available capacity.	The Irish Wind Atlas outlines that wind speeds in midlands bog groups are typically between 7 – 8 m/s. Therefore, this criterion is	Completely within preferred area in County Laois.	This criterion is neutral with respect to the outlined environmental effects as BnM wind farms are designed as per the recommended setbacks in the WEDG 2006 and the Draft WEDG 2019.	No Natura sites within the site, medium level of Natura sites in the wider area (reasonable proximity to Slieve Bloom Special Protection Area (SPA)). Mainly low with some medium value habitat within the site.	There are 7 no. wind farm sites (either constructed, consented, or proposed) within 25km of the proposed turbines.	The site is at a significant distance from local and regional airports. It is located in close proximity to the M7.	Large areas of the site have medium to high levels of peat. There are no other significant uses at the site.	There are two masts adjacent to the site.	The site is not pumped. It has no recognised flood point in the local area.	The site has access to the regional road R445 and is adjacent to the M7.

Candidate Sites	Grid Access/ Capacity	Wind Resource Assessment	CDP and Zoning	Proximity to Houses	Environmental Sensitivity	Landscape Capacity/ Cumulative Impact	Aviation	Land Use	Communications Infrastructure	Flood Plain Analysis	Supporting Infrastructure
		neutral across all sites.									
Derryarkin (Derrygreenagh)	Site is within reasonable proximity to existing 110 kV grid infrastructure with potential available grid capacity.	The Irish Wind Atlas outlines that wind speeds in midlands bog groups are typically between 7 – 8 m/s. Therefore, this criterion is neutral across all sites.	Within High Risk in County Westmeath, Low Risk area in County Offaly.	This criterion is neutral with respect to the outlined environmental effects as BnM wind farms are designed as per the recommended setbacks in the WEDG 2006 and the Draft WEDG 2019.	No Natura areas in the site, low to medium number of Natura sites in the wider area, Mixture of low, moderate and high value habitat on the site.	There are 4 no. wind farm sites (either constructed, consented, or proposed) within 25km of the proposed turbines.	The site is at a significant distance from local and regional airports. It is located in close proximity to the M6.	Significant areas (>75%) of the site have low levels of peat. There is a low level of commercial forestry at the site and also some areas of quarrying.	There is a mast in Derrygreenagh works with 5 identified links through the site.	The site is not pumped. It has no recognised flood point in the local area.	The site has access to the R400 and is adjacent to the M6.
Proposed Garryhinch Wind Farm (PL Ref: PC19.315157)	Site is within reasonable proximity to existing 110 kV grid infrastructure with potential available grid capacity.	The Irish Wind Atlas outlines that wind speeds in midlands bog groups are typically 7 – 8 m/s. Therefore, this criterion is neutral across all sites.	Within area deemed Open for Consideration in Laois County Development Plan 2021-2027 and an area not deemed suitable in the Offaly County Development Plan 2021-2027.	This criterion is neutral with respect to the outlined environmental effects as BnM wind farms are designed as per the recommended setbacks in the WEDG 2006 and the Draft WEDG 2019.	No Natura areas in the site, low number of Natura sites in the wider area, Mixture of low to moderate value habitat on the site.	There are 8 no. wind farm sites (either constructed, consented, or proposed) within 25km of the proposed turbines.	The site is at a significant distance from local and regional airports as well as the main motorway network.	Significant areas of the site have low levels of peat. There are no other significant uses at the site.	There is a major telecoms hub on the Sliabh Blooms and two masts adjacent to the site with multiple links.	It has no recognised flood point in the local area.	The site has limited access to the regional and national road network.
Timahoe 2 Solar Farm (Timahoe South)	110kV network runs to the north of Timahoe South bog (i.e., through Timahoe North bog) with potential available capacity.	The Irish Wind Atlas outlines that wind speeds in midlands bog groups are typically between 7 – 8 m/s. Therefore, this criterion is neutral across all sites.	In an area considered medium compatibility with solar developments in Kildare County Development Plan 2023-2029.	This criterion is neutral with respect to the outlined environmental effects as BnM wind farms are designed as per the recommended setbacks in the WEDG 2006 and the Draft WEDG 2019.	No Natura areas in the site, low number of Natura sites in the wider area, Mixture of low, moderate and high value habitat on the site.	There are 7 no. wind farm sites (either constructed, consented, or proposed) within 25km of the site.	This site is close to Casement Aerodrome. It is located proximate to the M4.	Large areas of the site have low levels of peat. The site is also used for waste processing and as an engineered landfill.	There are some links on the northern boundary.	The site is pumped. It has no recognised flood point in the local area.	The site has direct access to the R415.
Ballybeg (Derrygreenagh)	110 kV grid infrastructure runs to south of Ballybeg with potential available grid capacity.	The Irish Wind Atlas outlines that wind speeds in midlands bog groups are typically between 7 – 8 m/s. Therefore, this criterion is neutral across all sites.	Partially in area Open for Consideration in Offaly County Development Plan 2021-2027, partially with scenic buffer zone (Croghan Hill).	This criterion is neutral with respect to the outlined environmental effects as BnM wind farms are designed as per the recommended setbacks in the WEDG 2006 and the Draft WEDG 2019.	No Natura sites within the boundary, Low number of Natura sites in the wider area, mixture of low and high value habitats within the site.	There are 7 no. wind farm sites (either constructed, consented, or proposed) within 25km of the site.	The site is at a significant distance from local and regional airports. It is located in relative proximity to the M6.	Significant areas (>75%) of the site have low levels of peat. There are no other significant uses at the site.	It has 5 links that cross the site.	The site is pumped. It has no recognised flood point in the local area.	The site has access to the R400.

3.2.4 Alternative Renewable Electricity Technologies

Both onshore and offshore wind energy development and solar energy developments will be required to ensure Ireland reaches the target set in the Climate Action Plan 2025 (CAP25) to source 80% of our electricity from renewable energy by 2030. CAP25 has set out the following targets for electricity generation:

- Share of electricity demand generated from renewable sources to up to 80% where achievable and cost effective, without compromising security of electricity supply;
- Onshore Wind Capacity: up to 9 Gigawatt (GW)
- Offshore Wind Capacity: 5GW (minimum)
- Solar PV Capacity: 8GW

When considering alternative renewable energy developments to the Proposed Project, the Applicant considered offshore wind and commercial solar energy production.

3.2.4.1 Offshore Wind

Although the screening exercise was based on identifying lands for onshore wind development; another alternative source of renewable electricity generation would be offshore wind energy.

The Applicant has a keen interest in offshore wind farms and has explored potential offshore sites, recently launching an offshore partnership with Ocean Winds to identify and develop offshore wind energy opportunities around the coast of Ireland.

However, it is considered that due to delays with the regulatory process for offshore development, a combination of both onshore and offshore wind farm development will continue to be required to deliver on the ambitious renewable energy targets set out under CAP25 which include focusing on onshore wind energy developments to reach the 2025/2030 renewable energy targets. As such, the Applicant's primary focus is on onshore wind farms, and the Applicant will continue to explore potential development offshore in tandem with delivering suitable sites onshore such as the Proposed Project.

The Applicant is committed to playing a key role in helping the State achieve its CAP25 objectives while building upon its proven record of generating clean renewable energy to the national grid. As such, the option of an offshore project is not considered to be a reasonable alternative at this time.

3.2.4.2 Solar

Commercial solar energy production is the harnessing and conversion of sunlight into electricity using PV arrays (panels).

The amount of electrical energy output from renewable generation is generally described in terms of capacity factor. The capacity factor relates to the amount of energy that may be achieved from a renewable technology over the period of one calendar year. Generally solar PV has a lower capacity factor than wind generation. One factor in the energy yield difference is that solar PV does not produce electrical energy at night, but the wind can blow at any time of the day or night. As identified within the Sustainable Energy Authority of Ireland (SEAI) '*Energy in Ireland – 2025 Report*[2], the capacity factor for the Irish national grid is 29.2%. In order to achieve a c. 322MW output using solar PV arrays, there

[2] *SEAI (2025) Energy In Ireland 2025 (https://www.seai.ie/sites/default/files/publications/Energy-in-Ireland-2025.pdf)*

would be a requirement of approximately 515ha[3], which represents approximately 10% of the Project Site.

Due to the smaller development footprint of the Proposed Project infrastructure and associated larger MW output, the Proposed Wind Farm was progressed over a proposed solar development. As detailed in Section 1.1.1 in Chapter 1, the Project Site encompasses an area of approximately 5,157 hectares and the permanent footprint of the Proposed Project measures approximately 154 hectares, which represents approximately 2.9% of the Project Site.

A comparison of the potential environmental effects of the development of a solar PV array when compared against the chosen option of developing the Proposed Wind Farm at this site are presented in Table 3-4 below.

Table 3-4 Comparison of environmental effects for an alternative technology e.g., solar when compared against the chosen option (wind turbines)

Environmental Consideration	Solar PV Array (c. 322MW)	Chosen Option (Wind Farm – c. 322MW)
Population & Human Health (incl. Shadow Flicker)	No potential for shadow flicker to affect sensitive receptors. Potential for glint and glare impacts on local receptors. Lower potential for noise and vibration effects. Lower potential for visual obstructions in the skyline due to solar farms being low-lying structures. Based on the renewable energy outputs associated with solar PV, using solar PV at the Project Site would have a positive effect on human health due to the production of clean renewable energy and the offsetting of emissions (e.g., nitrogen, sulphur dioxide) which are produced from fossil fuel powered sources of electricity.	Based on the assessment detailed in Chapter 5 and the mitigation measures proposed, there will be no significant effects related to shadow flicker from the Proposed Wind Farm. No potential for glint and glare impacts on sensitive receptors. Based on the assessment included in Chapter 10 and Chapter 11, the Proposed Project will have a long term significant positive effect on air quality and climate due to the production of clean renewable energy and the offsetting of emissions (e.g., nitrogen, sulphur dioxide) which are produced from fossil fuel powered sources of electricity. Based on the assessment in Chapter 10, there will be no significant effects on human health resulting from exhaust and dust emissions during the construction, operation, and decommissioning phases of the Proposed Project. Based on the Assessment in Chapter 12 Noise and Vibration, the Proposed Project will have no significant effects on sensitive receptors. As detailed in Chapter 13 Landscape and Visual, the landscape type and character of the area where the Proposed Turbines are sited comprises peatland landscape types of moderate sensitivity and can effectively accommodate wind energy development. Of the 27 no. VPs assessed 3 no. were deemed not significant, 12 no. were deemed slight, 8 no.

[3] *Approximately 1.6 - 2 ha are required for each MW of solar panels installed based on approximately 4000 panels per MW (taken from the Sustainable Energy Authority Solar Energy FAQ publication which can be accessed here: https://www.seai.ie/publications/FAQs_on_Solar_PV.pdf). For the purposes of comparison, a minimum value of 1.6 ha has been assumed.*

Environmental Consideration	Solar PV Array (c. 322MW)	Chosen Option (Wind Farm – c. 322MW)
		were deemed moderate, and 4 no. were deemed significant. The number of receptors experiencing these effects is very low as the landscape surrounding the proposed turbines has a low population density. Visual effects will decrease with distance from the proposed turbines.
Biodiversity & Birds	A larger development footprint would result in greater habitat loss/impact due to the higher level of drainage requirement. Potential for glint and glare impacts on birds. No potential for collision risk with birds and bats.	A smaller development footprint would result in less habitat loss. As detailed in Chapter 6 Biodiversity, the development has been designed to avoid or mitigate impacts on biodiversity including bats and downstream aquatic receptors. The Proposed Project includes for a Biodiversity Management Plan (BMP) proposal providing a local boost to biodiversity, birds, and water quality. With regard to collision risk, as detailed in the Bat Report in Appendix 6-2 of this EIAR, site-level collision risk for high collision risk bat species with Proposed Turbines was typically Low to Medium. Therefore, there will be no significant effects on bats. With the implementation of the mitigation measures described in Chapter 7 Birds, and Appendix 7-6, there will be significant effects on wintering Golden Plover and breeding Lapwing due to collision risk prior to mitigation being applied. No significant effects will occur post-mitigation. Furthermore, there will be no impact for glint and glare on birds.
Land, Soils & Geology	Shallower excavations involved in solar PV array developments would result in reduced volume of peat and spoil to be excavated.	As detailed in the assessment in Chapter 8, there is no loss of peat, topsoil or subsoil as a result of the Proposed Project. Peat, topsoil and subsoil will be relocated within the Site. No significant effects on peat, soils and subsoils will occur. The peat and spoil management proposals discussed in Chapter 4 sets out the optimal treatment for peat and spoil excavated/generated on site without creating significant impacts for biodiversity, hydrology, land use, etc.
Geotechnical/Peat Stability	Shallower excavations involved in solar PV array developments would decrease the potential for peat instability (construction phase).	Deeper excavations required which increases the potential for peat instability (construction phase). However, there is no potential for peat slippage. The Proposed Wind Farm site is located on a relatively flat-lying site. The flat

Environmental Consideration	Solar PV Array (c. 322MW)	Chosen Option (Wind Farm – c. 322MW)
		topography/nature of the terrain on site reflects the low risk of peat failure.
Water	Shallower excavations involved in solar PV array developments would result in reduced volume of peat and spoil to be excavated and stored on site, therefore reducing the potential for silt-laden runoff to enter receiving waterbodies. The larger development footprint would result in a larger area of impermeable surfaces and would result in increased drainage requirements.	Project design specific drainage design removes the potential for significant environmental effects. As detailed in the assessment in Chapter 9, no significant effects on surface water or groundwater quality will occur.
Air Quality	Increased potential for dust and other noxious emissions due to larger volume of transport movements to and from the Project Site and larger volume of plant and ground works on site due to the larger footprint. Reduced capacity factor of solar PV array technology would result in more reliance on fossil fuels for energy generation and therefore decreased air quality improvements nationally.	Increased capacity factor of wind energy technology would result in a reduced reliance on fossil fuels for energy generation and therefore increased air quality improvements. As detailed in the assessment in Chapter 10, the Proposed Project will have a long-term, significant, positive effect on air quality during the operational phase.
Climate	Reduced capacity factor of solar PV array technology would result in less carbon offset.	Greater capacity factor resulting in a shorter carbon payback period. As detailed in the assessment in Chapter 11 Climate, over the proposed 35-year lifetime of the Proposed Project, 5,139,995 tonnes of carbon dioxide will be displaced from traditional carbon-based electricity generation.
Noise & Vibration	Potential for short-term noise and vibration impacts on nearby sensitive receptors during the construction phase. Increased traffic movements and increased plant on site due to the larger footprint could lead to larger noise and vibration output during the construction phase. Less potential for noise and vibration impacts on nearby sensitive receptors during the operational phase.	Based on the assessment detailed in Chapter 12 and the mitigation measures proposed, there will be no significant effects on sensitive receptors due to an increase in noise and vibration levels from the Proposed Project during the construction and operational phase.

Environmental Consideration	Solar PV Array (c. 322MW)	Chosen Option (Wind Farm – c. 322MW)
Landscape & Visual	Panelling potentially less visible from surrounding area due to the screening by vegetation and topography.	Greater visibility due to the vertical scale of the proposed turbines. As detailed in Chapter 13 Landscape and Visual, the landscape type and character of the area where the Proposed Turbines are sited comprises peatland landscape types of moderate sensitivity and can effectively accommodate wind energy development. Of the 27 no. VPs assessed 3 no. were deemed not significant, 12 no. were deemed slight, 8 no. were deemed moderate, and 4 no. were deemed significant. The number of receptors experiencing these effects is very low as the landscape surrounding the proposed turbines has a low population density. Visual effects will decrease with distance from the proposed turbines.
Cultural Heritage	Larger development footprint would increase the potential for impacts on unrecorded, subsurface archaeology.	Smaller development footprint would decrease the potential for impacts on unrecorded, subsurface archaeology. As detailed in Chapter 14, there will be no significant effects on known or unknown archaeology and cultural heritage during the construction, operation and decommissioning phases. Archaeological monitoring under licence will be implemented during the construction phase.
Material Assets	Potential for greater traffic volumes during construction phase due to the number of solar panels required to achieve the same output as wind. Potential for a lesser impact on road capacity due to no required accommodation works for solar panel delivery to the site. Greater potential for impacts on waste management due to increased plant on site giving rise to increase waste materials. No material difference for impacts on gas or water. No potential for impacts on telecommunications.	No material difference for impacts on gas and water. Buffers implemented on telecommunication links. As detailed in 15.3.5.3 during the operational phase there will be a positive significant effect on electricity due to the displacement from traditional carbon-based electricity generation. As detailed in Section 15.2 and 15.3 of Chapter 15, there will be no negative significant effects post-mitigation on telecommunications and other material assets during the construction, operational, and decommissioning phases of the Proposed Project.
Aviation	Potential effects on aviation resulting from glint and glare of a solar development.	As detailed in Chapter 16, there will be a significant negative effect on the Edenderry Low Flying Training Area (LFTA). The Applicant is open to engaging with the DoD in relation to an agreement to move the low flying

Environmental Consideration	Solar PV Array (c. 322MW)	Chosen Option (Wind Farm – c. 322MW)
	Likely significant negative impacts to the Edenderry LFTA due to larger development footprint and associated loss of land for available for low flying training activities to occur.	area to an alternative suitable area; should a suitable area be identified and agreed there will be no significant effect on LFTAs due to the Proposed Project. Further information on the Edenderry LFTA is detailed in Section 16.7.2.2 of Chapter 16. No other significant effects will occur on aviation during the construction, operational, and decommissioning phases of the Proposed Project.
Major Accidents and Natural Disasters	Decreased vulnerability to major accidents and natural disasters due to low profile design. Shallower excavations involved in solar PV array developments would decrease the potential for peat instability during the construction phase.	As detailed in Chapter 17 the risk of a major accident and/or disaster during the construction of the Proposed Project is considered 'low'. The highest risk scenarios to the Proposed Project (i.e., contamination, fire/explosion, and aviation) are considered to be unlikely to occur at any phase of the Proposed Project. A detailed risk assessment on potential risks relating to major accidents and natural disasters is provided in Section 17.4 of Chapter 17 of this EIAR.

While there are positive and negative environmental aspects of both renewable energy development options, neither is likely to have significant adverse effects. However, given the particular suitability of the Project Site for wind energy development, i.e., the lesser area of land required and the significant positive impact on climate and air quality, it was considered that wind energy was the most suitable option and most efficient method of electricity production for the Project Site with the least potential for significant environmental effects.

3.2.5 Alternative Project Design Options

3.2.5.1 BnM Wind Farm Design and Construction

As outlined in Section 3.2.3 above, the peatlands within the Applicant's landbank offer many advantages for the development of onshore wind farms. The successful delivery of onshore wind within peatlands has been proven on a number of constructed and operational wind farm projects throughout Ireland, including BnM's Bruckana Wind Farm[4] (operational since 2014), Mountlucas Wind Farm[5] (operational since 2015), Cloncreen Wind Farm[6] (operational since 2022), Oweninny Wind Farm[7] (Phase 1 operational since 2019 and Phase 2 operational since 2023[8])), and most recently, Derrinlough Wind Farm[9] operational since 2026.

The experience gained from these projects, and others within the Applicant's landbank (completed and ongoing) has directly shaped the design process for the Proposed Project. These sites of the renewable energy projects listed above share a number of defining characteristics with the Project Site, including post-industrial cutaway peatland substrates, soft-ground geotechnical conditions, comparable ecological

[4] https://www.bruckanawindfarm.ie/
[5] https://www.mountlucaswindfarm.ie/
[6] https://www.cloncreenwindfarm.ie/
[7] https://www.oweninnywindfarm.ie/
[8] *Ibid.*
[9] https://www.derrinloughwindfarm.ie/

receptor profiles, and a similar community and planning policy context within the Midlands region. The constraint-led layout methodology established at the above listed projects – whereby ecological, hydrological, visual and residential setback constraints are identified at the outset, with turbine positions then fitted to the viable area – has been adopted as the foundational design approach for Proposed Project. This methodology ensures that alternatives which would give rise to significant environmental impacts are removed from consideration early in the design process, prior to detailed assessment.

In addition to project design, the work completed by BnM on existing and ongoing projects has resulted in transferred experience from their preceding projects that have gone through the pre-application consultation, detailed design, and construction phases. In advance of submitting planning applications for projects such as Cloncreen Wind Farm and Derrinlough Wind Farm, BnM engaged in extensive pre-application consultation with An Coimisiún Pleanála, statutory consultees, and local communities. The outcomes of these pre-application processes – including the identification of key environmental sensitivities, the refinement of turbine layouts in response to consultee feedback, and the establishment of appropriate setback distances and mitigation frameworks – have been carried forward as baseline design standards for the Proposed Project.

Taken together, this body of project experience provides a strong and evidence-based rationale for the design choices made at the Project Site and the alternatives that were considered and set aside during the design evolution process resulting from lessons learned from previous projects.

A table is provided below outlining the key design elements of the Proposed Project and how the experience gained on preceding projects has directly informed the design and methodologies being applied for as part of this planning application.

3.2.5.2 Alternative Turbine Numbers and Model

The Proposed Turbines will have a potential power output in the 4-to-7-megawatt (MW) range. It is proposed to install 46 no. turbines at the Project Site which will have an estimated installed capacity of 322MW. Such a wind farm could also be achieved on the Project Site by using smaller turbines (for example 2.5MW machines). However, this would necessitate the installation of approximately 131 no. turbines to achieve a similar output. Furthermore, the use of smaller turbines would not make as efficient use of the wind resource available at higher elevations above ground level, having regard to the nature of the Project Site. A larger number of smaller turbines would result in the wind farm occupying a greater footprint within the Proposed Wind Farm site, with a larger amount of supporting infrastructure being required (i.e., roads, steel, etc.) and increasing the potential for negative environmental impacts to occur on biodiversity, hydrology and traffic and transportation. 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 46-turbine layout selected for the Project Site has the smallest development footprint of the other alternatives considered, while still achieving the optimum output than would be achievable using different turbines.

Of the 46 no. Proposed Turbines to be installed on the Proposed Wind Farm site, 27 no. Proposed Turbines will have an overall ground-to-blade tip height of 220 metres, rotor diameter of 170m and a hub height of 135m and 19 no. Proposed Turbines will have an overall ground-to-blade tip height of 200m, blade rotor diameter of 170 metres and hub height of 115 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 3-5 below.

Table 3-5 Comparison of environmental effects between larger quantity of smaller turbines against the chosen option of a 46 no. turbine layout.

Environmental Consideration	Larger number of smaller turbine models	Chosen Option (46-no. turbine layout)
Population & Human Health (incl. Shadow Flicker)	Greater potential for shadow flicker and noise impacts on nearby sensitive receptors due to the increased number of turbines. However, these can be curtailed to meet threshold criteria. Smaller turbines would be less visually obstructive in the skyline; however, the larger development footprint would spread further across the landscape potentially occupying a larger portion of a viewpoint.	Based on the assessment detailed in Chapter 5 and the mitigation measures proposed, there will be no significant effects on population and human health from shadow flicker and noise and vibration during the construction, operation and decommissioning phases of the Proposed Project. Decreased potential for shadow flicker due to greater setbacks from houses, greater separation between turbines thus reducing aggregated shadow flicker time. Reduced potential for noise impacts on nearby sensitive receptors due to a reduced number of turbines. As stated in Chapter 12 Noise and Vibration, there is no potential for significant noise and vibration effects from the Proposed Turbines. Furthermore, noise emissions can be curtailed to meet threshold criteria. As detailed in Chapter 13 Landscape and Visual, the landscape type and character of the area where the Proposed Turbines are sited comprises peatland landscape types of moderate sensitivity and can effectively accommodate wind energy development. Of the 27 no. VPs assessed 3 no. were deemed not significant, 12 no. were deemed slight, 8 no. were deemed moderate, and 4 no. were deemed significant. The number of receptors experiencing these effects is very low as the landscape surrounding the proposed turbines has a low population density. Visual effects will decrease with distance from the proposed turbines.
Biodiversity & Birds	Larger development footprint would result in greater potential for habitat loss. Due to the greater number of turbines present there would be a much higher risk of collision for bird and bat populations at the Project Site.	As detailed in Chapter 6 Biodiversity, the Proposed Project has been designed to avoid or mitigate impacts on biodiversity including bats and downstream aquatic receptors. As per Chapter 6 of this EIAR, there are no significant long-term negative effects expected on biodiversity receptors. The Proposed Project includes for a Biodiversity Management Plan (BMP) proposal providing a local boost to biodiversity, including birds, and water quality.

Environmental Consideration	Larger number of smaller turbine models	Chosen Option (46-no. turbine layout)
		With regard to collision risk, as detailed in the Bat Report in Appendix 6-2 of this EIAR, site-level collision risk for high collision risk bat species with Proposed Turbines was typically Low to Medium. Therefore, there will be no significant effects on bats. With the implementation of the mitigation measures described in Chapter 7 Birds and Appendix 7-6, the residual effects for collision risk are not significant.
Land, Soils & Geology	Larger development footprint would result in greater volume of spoil to be generated, excavated and sorted. Neutral – geotechnical investigations followed by careful design would lead to no significant environmental impacts.	Smaller footprint would result in smaller volume of peat and soils to be excavated and managed. The peat and spoil management proposals discussed in Chapter 4 sets out the optimal treatment for peat spoil generated on site without creating significant impacts for biodiversity, hydrology, land use, etc. Neutral – geotechnical investigations were carried out followed by careful design would lead to no significant environmental impacts. As detailed in the assessment in Chapter 8, no significant effects on peat, topsoil, and subsoils will occur.
Geotechnical/Peat Stability	Neutral (the larger quantity of smaller turbines would still be designed to minimise peat slippage).	Neutral (the 46 no turbine layout has been designed to minimise peat slippage).
Water	The larger quantity of smaller turbines would be designed to ensure no significant effects on hydrology, however a larger development footprint, would increase the potential for silt-laden runoff to enter receiving waterbodies.	The 46 no. turbine layout has been designed to minimise hydrological impacts. Furthermore, the smaller footprint would result in less potential for silt laden run-off to enter a waterbody. As detailed in the assessment in Chapter 9, no significant effects on surface water or groundwater quality will occur.
Air Quality	Increased potential for vehicle and construction dust emissions due to an increased volume of construction material and turbine component deliveries to the Site, giving rise to a reduced air quality locally for the construction phase.	Decreased potential for vehicle emissions and dust emissions due to a decreased volume of construction material and turbine component deliveries to the Site. As detailed in Chapter 10, the Proposed Project will have a long-term, significant, positive effect on air quality during the operational phase.
Climate	Increased potential for greenhouse gas emissions from the construction	Decreased potential for vehicle emissions and dust emissions due to a decreased

Environmental Consideration	Larger number of smaller turbine models	Chosen Option (46-no. turbine layout)
	phase and a larger loss of carbon storing potential from the larger development footprint within the bog. Decreased potential in terms of carbon savings due to increased potential for greenhouse gases identified above.	volume of construction material and turbine component deliveries to the Site. As detailed in the assessment in Chapter 11 Climate, over the proposed 35-year lifetime of the Proposed Wind Farm, 5,139,995 tonnes of carbon dioxide will be displaced from traditional carbon-based electricity generation. The addition of an estimated 322MW clean energy to the national grid will be a positive contribution to the State's renewable energy targets set out in CAP25.
Noise & Vibration	Potential for increased noise impacts on nearby sensitive receptors due to reduced separation distance between sensitive receptors and turbine locations and additional turbine generators.	Potential for decreased noise levels at nearby sensitive receptors due to increased separation distance between sensitive receptors and turbine locations. Based on the assessment detailed in Chapter 12, there will be no significant effects on sensitive receptors during the construction operational and decommissioning phases from the Proposed Project.
Landscape & Visual	Neutral - Smaller turbines may be less visually intrusive on the landscape. Equally, a larger number of smaller turbines would be spread over a wider area, taking up a greater portion of a viewpoint.	The Proposed Wind Farm is an appropriately designed and suitably scaled project. As detailed in Chapter 13 Landscape and Visual, the landscape type and character of the area where the Proposed Turbines are sited comprises peatland landscape types of moderate sensitivity and can effectively accommodate wind energy development. Of the 27 no. VPs assessed 3 no. were deemed not significant, 12 no. were deemed slight, 8 no. were deemed moderate, and 4 no. were deemed significant. The number of receptors experiencing these effects is very low as the landscape surrounding the proposed turbines has a low population density. Visual effects will decrease with distance from the proposed turbines.
Cultural Heritage	Larger development footprint would increase the potential for impacts on unrecorded, subsurface archaeology.	Smaller development footprint would decrease the potential for impacts on unrecorded, subsurface archaeology. As detailed in the assessment in Chapter 14, there will be no significant direct or indirect effects on known or unknown archaeology and cultural heritage during the construction, operation and decommissioning phases. Archaeological monitoring under licence will be

Environmental Consideration	Larger number of smaller turbine models	Chosen Option (46-no. turbine layout)
		implemented during the construction phase.
Material Assets – 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.	Potential for smaller traffic volumes during construction phase due to smaller development footprint and requirement for fewer construction materials and turbine components.
Material Assets – Utilities, Waste Management, Telecommunications and Aviation	No material difference between the two options for gas, water, waste management, and telecommunications as the larger quantity of smaller turbines would still be designed to minimise impacts on material assets.	No material difference between the two options for gas, water, waste management, and telecommunications as (the 46 no. turbine layout would still be designed to minimise impacts on material assets).
Aviation	No material difference between the two options for aviation as the larger quantity of smaller turbines would still be designed to minimise impacts on aviation.	No material difference for impacts on aviation. As detailed in Chapter 16, there will be a significant negative effect on the Edenderry Low Flying Training Area (LFTA). The Applicant is open to engaging with the DoD in relation to an agreement to move the low flying area to an alternative suitable area; should a suitable area be identified and agreed there will be no significant effect on LFTAs due to the Proposed Project. Further information on the Edenderry LFTA is detailed in Section 16.7.2.2 of Chapter 16. No other significant effects will occur on aviation during the construction, operational, and decommissioning phases of the Proposed Project.
Major Accidents and Natural Disasters	A larger number of turbines could have a greater potential risk relating to major accidents and natural disasters.	As detailed in Chapter 17 the risk of a major accident and/or disaster during the construction of the Proposed Project is considered 'low'. The highest risk scenarios to the Proposed Project (i.e., contamination, fire/explosion, and aviation) are considered unlikely to occur at any phase of the Proposed Project. A detailed risk assessment on potential risks relating to major accidents and natural disasters is provided in Section 17.4 of Chapter 17 of this EIAR.

For the reasons set out above, the proposal for a 46-no. turbine layout with larger turbines was considered to have a lower overall environmental impact when compared to a larger number of smaller turbines.

3.2.5.3 Alternative Turbine Layout and Design

The design of the Proposed Wind Farm has been an informed and collaborative process from the outset, involving the designers, developers, engineers, landowners, environmental, hydrological, geotechnical, archaeological, traffic specialists, statutory and non-statutory stakeholder and the local communities.

Throughout the preparation of the EIAR, the layout of the Proposed Wind Farm has been revised and refined to take account of the findings of all site investigations and baseline assessments, which have brought the design from its initial layout, through an interim layout to the Proposed Wind Farm layout. The design process has also considered the recommendations and comments of the relevant statutory and non-statutory organisations, the local community and local authorities (as detailed in Chapter 2 of the EIAR: Background to the Proposed Project) while seeking to ensure that a viable project can be constructed and connected to the national grid.

3.2.5.3.1 *Constraints Mapping*

The design and layout of the Proposed Wind Farm follow the recommendations and guidelines set out in the WEDG 2006 and the *'Best Practice Guidelines for the Irish Wind Energy Industry'*[10] (Irish Wind Energy Association, 2012).

The WEDG 2006 are currently the subject of a targeted review. The proposed changes to the assessment of impacts associated with onshore wind energy developments are outlined in the document *'Proposed Revisions to Wind Energy Development Guidelines 2006 – Targeted Review'* (2013), the '*Review of the Wind Energy Development Guidelines 2006 – Preferred Draft Approach'* (June 2017), and the Draft WEDG 2019. A consultation process in relation to the Draft WEDG 2019 closed on 19th February 2020. The proposed changes presented in the Draft WEDG 2019 give certain focus on the setback distance from residential properties (four times the proposed maximum tip height), along with shadow flicker and noise requirements relative to sensitive receptors. At time of writing, Draft WEDG 2019 have not yet been adopted, and the relevant guidelines for the purposes of this application, remain those issued in 2006. Due to the timelines associated with the planning process for renewable energy projects and the commitment within the CAP 2025 to publish revised wind energy development guidelines for onshore wind by Q1 2025 (refer to Section 1.2.2), it is possible that the Draft WEDG 2019 will be adopted during the consideration period for the Proposed Project.

The constraints mapping process involves the placing of buffers around different types of constraints so as to clearly identify the areas within which no development works will take place. The size of the buffer zone for each constraint has been assigned either using guidance presented in the Draft WEDG 2019 which is more onerous than the buffer zones as detailed in the current WEDG 2006 or based on industry best practice.

The constraints map for the site, as shown in Figure 3-1, encompasses the following constraints and associated buffers:

- Residential dwellings plus an 880m buffer to the nearest turbine (meeting the proposed requirement for a separation distance of 4 times the proposed tip height from the curtilage of properties in line with the Draft WEDG 2019). For the purposes of identifying the greatest 4 times setback buffer, a tip height of 220m has been utilised (i.e., with 200m tip height turbines located on the 'outer ring' of the Proposed Turbine layout, the closest residential receptor is approx. 4.5 x TH from the nearest Proposed Turbine);
- Minimum Separation Distance of 3 rotor diameters from the built Cushaling Wind Farm in line with the Draft WEDG 2019;

[10] https://windenergyireland.com/images/files/9660bdfb5a4f1d276f41ae9ab54e991bb600b7.pdf

- Two Rotor Diameters from internal BnM ownership boundary in line with the WEDG 2006 (Section 5.15 on Wind Take)
- European (Natura 2000) and Designated sites plus 200m buffer;
- Grand Canal proposed Natural Heritage Area plus 800m buffer;
- Habitats of County Importance (see Chapter 6: Biodiversity);
- Watercourses plus 50m buffer;
- Silt Ponds plus 50m buffer;
- Archaeological Sites or Monuments, plus 'Zone of Notification' as required by the National Monuments Service (ROI).
- Recorded Monuments plus 50m buffer;
- Shanavoola Area plus 20m buffer;
- Article 17 habitat plus 50m buffer;
- Broadleaved Woodland and Fen Habitat plus 50m buffer;
- Japanese Knotweed plus 50m buffer;
- Exclusion of the entire Lullymore Bog due to ecological sensitivities;
- Breeding Curlew habitat plus 800m buffer;
- Lapwing habitat plus 108m buffer;
- Uisce Eireann pipeline (Proposed Water Supply Project for the Eastern and Midlands Region (PL Ref: PA92.323980) plus 50m buffer; and
- Draft WEDG 2019 setback from National and Regional roads and railways of a distance equal to turbine tip height plus 10% (i.e., 242m). For the purposes of identifying the greatest setback buffer from national and regional roads and railway, a tip height of 220m has been utilised;

Facilitators at the Project Site refer to those aspects which build on the existing advantages and include the following:

- Lands are available for development;
- Good wind resource;
- Proximity to existing 220kV transmission lines for grid connection;
- Accessibility of site via Regional, and Local Roads;
- Existing site access points/entrances; and
- Limited extent of constraints.

The inclusion of the constraints on a map of the study area allows for a viable area to be identified. An initial wind farm layout was then developed to take account of all the constraints mentioned above and their associated buffer zones and the separation distances required. Following the mapping of all known constraints, detailed site investigations (4 no. rounds) were carried out, see Section 4.4.1.1.2 of Chapter 4 for detail on site investigative works completed to date.

The ecological assessment of the Project Site encompassed habitat mapping and extensive surveying of birds, bats and other fauna. This assessment, as described in Chapter 6 of this EIAR on Biodiversity, optimised the decision on the siting of turbines and the carrying out of any development works, such as the construction of roads.

The hydrological and geotechnical investigations at the Project Site examined the proposed locations for turbines, roads and other components of the Proposed Project, such as the Proposed Grid Connection infrastructure. Where specific areas were deemed as being unsuitable for the siting of turbines or roads, etc., alternative locations were proposed and assessed, taking into account the areas that were already ruled out by constraints.

The flat topography/nature of the terrain on site reflects the low risk of peat failure. A Peat Stability Risk Assessment (Appendix 8-1) was undertaken for the Project Site. A Factor of Safety (FoS) of less than 1.0 indicates that a slope is unstable; a FoS of greater than 1.0 indicates a stable slope. An acceptable FoS for slopes is generally taken as a minimum of 1.3. The stability analysis for this project, which analysed the turbine locations, access roads and substation, resulted in FoS above the minimum acceptable value

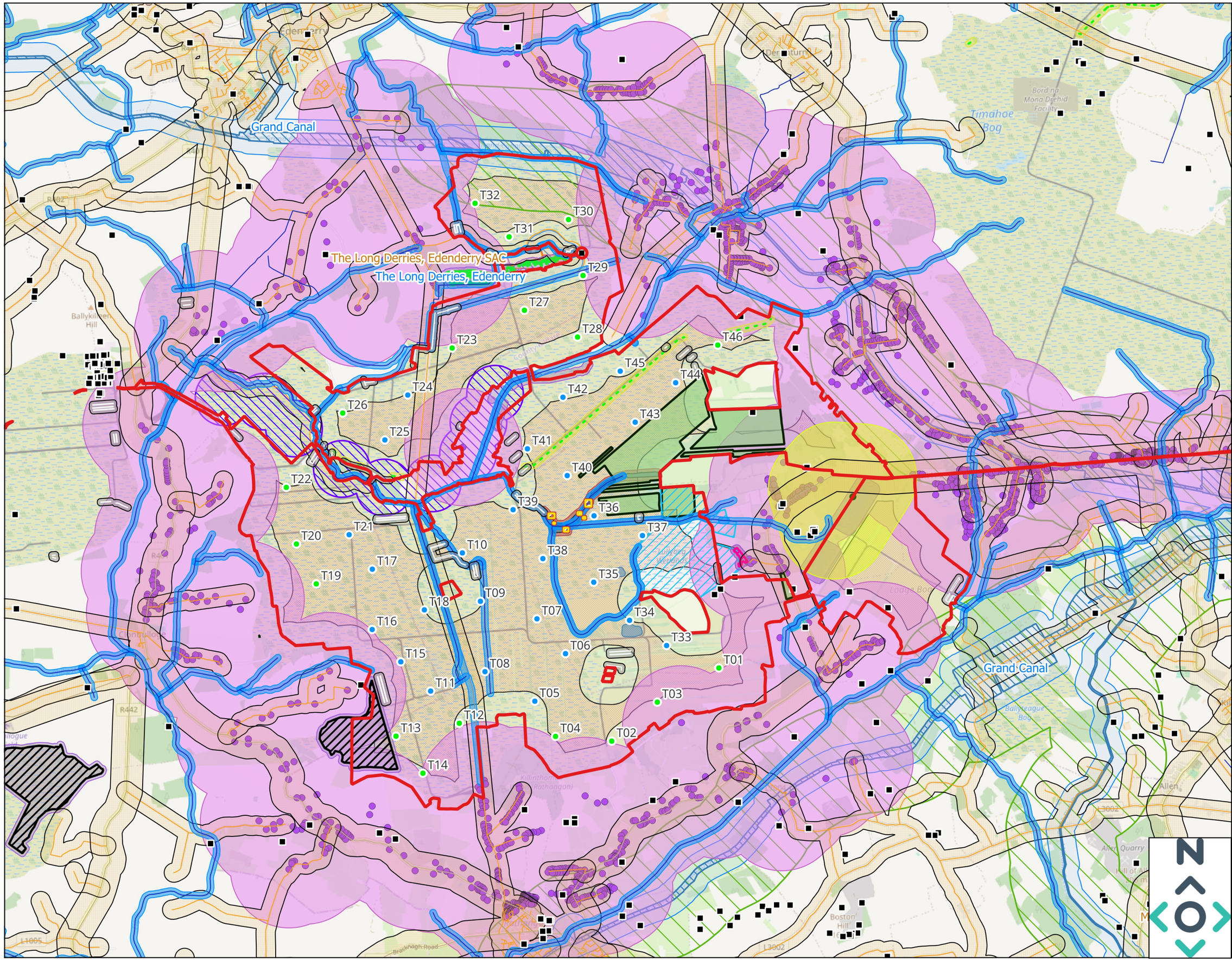
of 1.3 and hence the Project Site has a satisfactory margin of safety. Please see Appendix 8-1 for further details.

Through an iterative design process, informed by early-stage impact assessment, landscape modelling, Zone of Theoretical Visibility (ZTV) mapping, and photomontage preparation, the optimum layout for the Proposed Project has been developed with respect to landscape and visual factors. The layout brought forward for assessment minimises the theoretical extent of visibility, while detailed fieldwork and assessment confirm that actual visibility will be less than that predicted by the ZTV mapping. Where visibility does occur, the design accords with best practice guidance and presents a coherent project that integrates sympathetically with the receiving landscape. Appendix 13-5 provides detail on design evolution and embedded mitigation for LVIA and illustrates in detail how multiple LVIA surveys and assessment work have been undertaken across 2021 to 2026 to progressively inform the turbine layout and embedded landscape and visual mitigation into the Proposed Project.

Archaeological investigations, comprising a desktop study and detailed field surveys, identified all recorded National Monuments and Recorded Monuments within the vicinity of, and within, the Project Site. Key constraints and appropriate buffer distances were established to inform both the landscape and visual assessment and the design evolution of the Proposed Project. Please see Chapter 13 LVIA and 14 Cultural Heritage for further details.

The turbine layout for the Proposed Project has also been informed by wind data, the results of noise assessments, shadow flicker and the separation distance to be maintained between turbines. Thus, the baseline environmental assessment of the Project Site and Proposed Project design was an iterative process, where findings at each stage of the assessment were used to further refine the design, always with the intention of minimising the potential for environmental impacts.

As the Proposed Wind Farm design was refined, the biodiversity and ornithology mitigation and enhancement measures, detailed in the BMP included as Appendix 6-5, for the Proposed Project were also refined through an iterative design process. This process is outlined in Section 3.2.5.5 below.



Map Legend

- Project Site

Proposed Turbine Locations

- 200m Tip Height
- 220m Tip Height
- 425m (2.5 x RD) Buffer from Built Cushaling Wind Farm

Sensitive Receptors

- Sensitive Receptors
- 880m Sensitive Receptors Buffer

Water

- Watercourses
- 50m Watercourse Buffer
- Silt Ponds
- 50m Silt Pond Buffer

Cultural Heritage

- Recorded Monuments
- Shanavoola Areas
- 20m Shanvoola Area Buffer

Designated Sites

- 800m Grand Canal pNHA Buffer
- SAC
- 200m SAC Buffer
- pNHA
- 200m pNHA Buffer
- NHA
- 200m NHA Buffer

Offaly Article 17 Habitats 2020

- Active Raised Bog 2
- Old Oak Woodlands
- Orchid Rich Calcareous Grassl
- Article 17 Habitat 50m buffer

Ecology

- Broadleaved woodland
- 50m Broadleaved Woodland Buffer
- Coillte Land
- 50m Japanese Knotweed Buffer
- 50m Fen Habitat Buffer
- Lullymore Bog

Birds

- 108m Lapwing Buffer
- Breeding Curlew Habitat
- 800m Breeding Curlew Buffer

Material Assets

- Uisce Eireann Pipeline
- Uisce Eireann Pipeline 50m Buffer
- Roads 242m Buffer
- Two RDs from internal BnM ownership boundary in line with the WEDG 2006 (Section 5.13 on Wind Take)

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Drawing Title

Constraints Map

Project Title	
Ballydermot Wind Farm, Co. Offaly & Co. Kildare	
Drawn By: CJ	Checked By: EC
Project No.: 250708	Drawing No.: Figure 3-1
Scale: 1:50,000	Date: 2026-10-20

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3.2.5.3.2 *Alternative Proposed Wind Farm Design Iterations*

The final design of the Proposed Wind Farm takes account of all identified constraints and the distances that is to be maintained between turbines and the constraints such as houses, roads, etc. The layout is based on the results of all onsite investigations and hinterland surveys that have been carried out during the EIAR process and the EIA scoping process with statutory and non-statutory consultees. As information regarding the Proposed Project 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 Project Site and the requirement for buffer zones and other areas which should be avoided. The selection of the number of turbines and layout has also had regard to wind-take and the separation distance to be maintained between turbines, as well as landscape and visual, cultural heritage, noise and shadow flicker elements. The EIAR and Proposed Project design process was an iterative process, where findings at each stage of the assessment were used to further refine the design, always with the intention of minimising the potential for environmental impacts.

The development of the final Proposed Project layout has evolved following feedback from the various studies and assessments carried out as well as ongoing negotiations and discussions with landowners, the local community, and statutory consultees.

There were several reviews of the specific locations of the various turbines during the optimisation of the Proposed Wind Farm layout. The initial constraints study identified a significant viable area within the overall study area of the site. The initial turbine layout comprised 59 no. turbines within the same study area. The proposed 46 no. turbine final layout has been refined following feedback from the project team, the local community, and the need to ensure sufficient separation distances are maintained for on-site constraints. The Proposed Wind Farm went through 30 separate iterations. Plate 3-1 to Plate 3-6 below gives an indication of how the design of the turbine layout evolved throughout the design process.

Proposed Wind Farm Layout Iteration No. 1



Plate 3-1 Proposed Wind Farm Layout Iteration No. 1

An initial iteration of the Proposed Wind Farm included 59 no. turbines at 220, tip height as part of its design. This Iteration No. 1 represents the maximum number of turbines considered for the site. Turbine numbers were reduced following the application of known constraints to the Project Site.

Proposed Wind Farm Layout Iteration No. 2

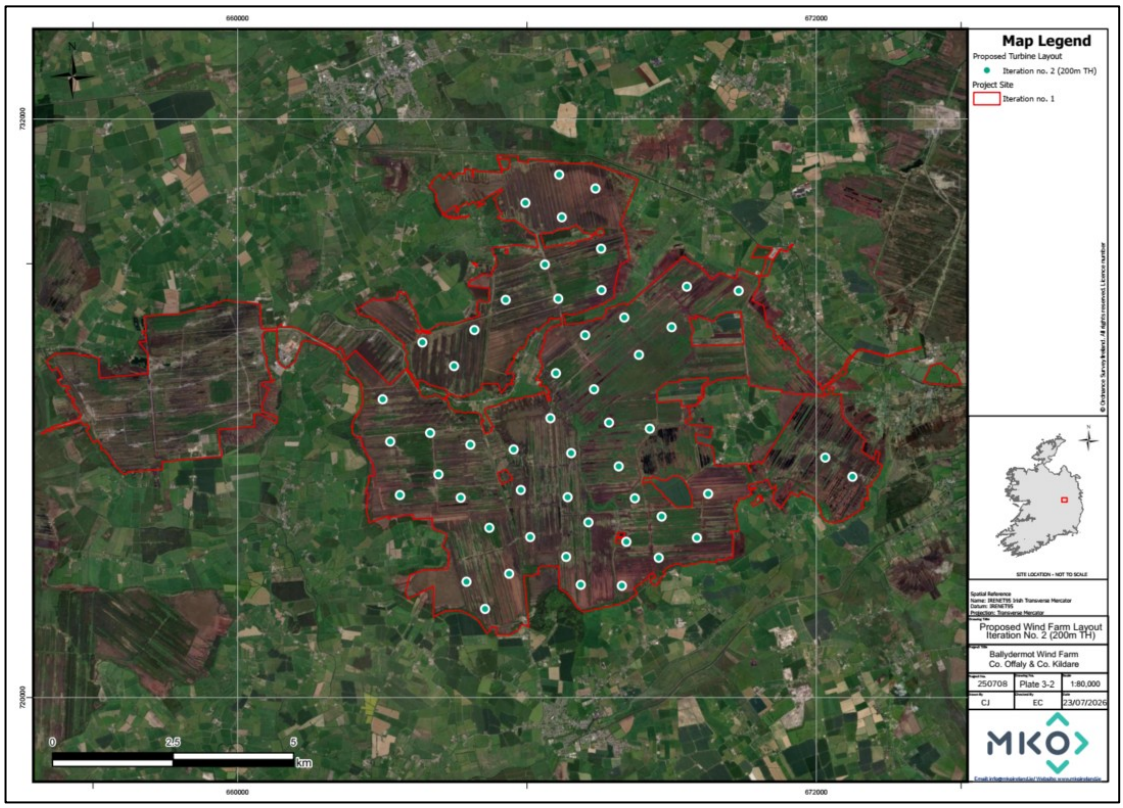


Plate 3-2 Proposed Wind Farm Layout Iteration No. 2a

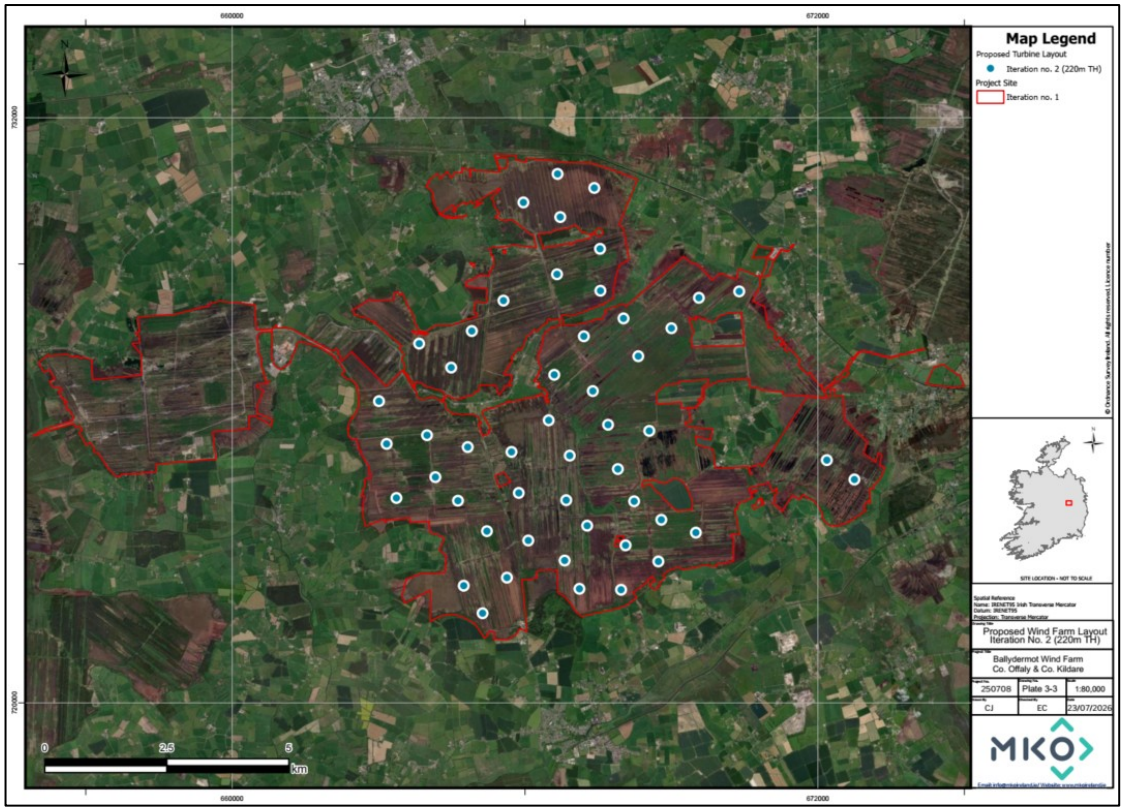


Plate 3-3 Proposed Wind Farm Layout Iteration No. 2b

Iteration No. 2 represents the initial turbine layouts which were based on a preliminary constraint mapping exercise and identification of a viable area for turbine siting. Iteration No. 2a, which is presented in Plate 3-2 above, is 1 of 2 initial turbine layouts which was based on a preliminary constraint mapping exercise and identification of a viable area for turbine siting. Iteration No. 2a, which is presented in Plate 3-2 above outlines the 200m tip height layout that was assessed concurrently with Iteration No. 2b. Given the lower tip height, Iteration No. 2b includes 52 no. turbines as part of its design. Iteration 2b includes 52 no. turbines at a tip height of 220m. The tip heights of the proposed turbines were a key factor undergoing assessment at this stage with Plate 3-3 outlining the 220m tip height layout.

Both Iteration No. 2a and 2b underwent a further review of constraints including necessary buffer zones for ecological features and receptors as well as the suitability of siting for the turbines. The design was further refined based on consideration of these constraints.

To assess the landscape and visual impacts a Residential Visual Impact Appraisal (RVIA) was carried out to look at the potential impact with regards to visual impact that the Proposed Turbines will have on the sensitive receptors in close proximity to the Proposed Wind Farm. Alternative turbine envelope specifications were generated for a series of preliminary Zone of Theoretical Visibility (ZTV) and photomontages in order to assess the extent to which alternative turbine dimensions may give rise to visual effects.

Based on the outputs of this assessment it was determined that the turbines in Lodge Bog appeared visually disconnected from the Proposed Wind Farm, therefore there was an opportunity mitigate discordant visual effects from scenic vistas and elevated vantage points to the south and east of the Proposed Wind Farm and to further set back the Proposed Turbines from Lodge Bog to the east to ensure alignment of the Proposed Project design with the guidance outlined in the Kildare County Development Plan. Therefore, the Proposed Turbine layout was updated to remove 2 no. turbines and the inclusion of 2 no. tip heights (i.e., 200m and 220m) was considered for the next Proposed Wind Farm design iteration.

Proposed Wind Farm Layout Iteration No. 3

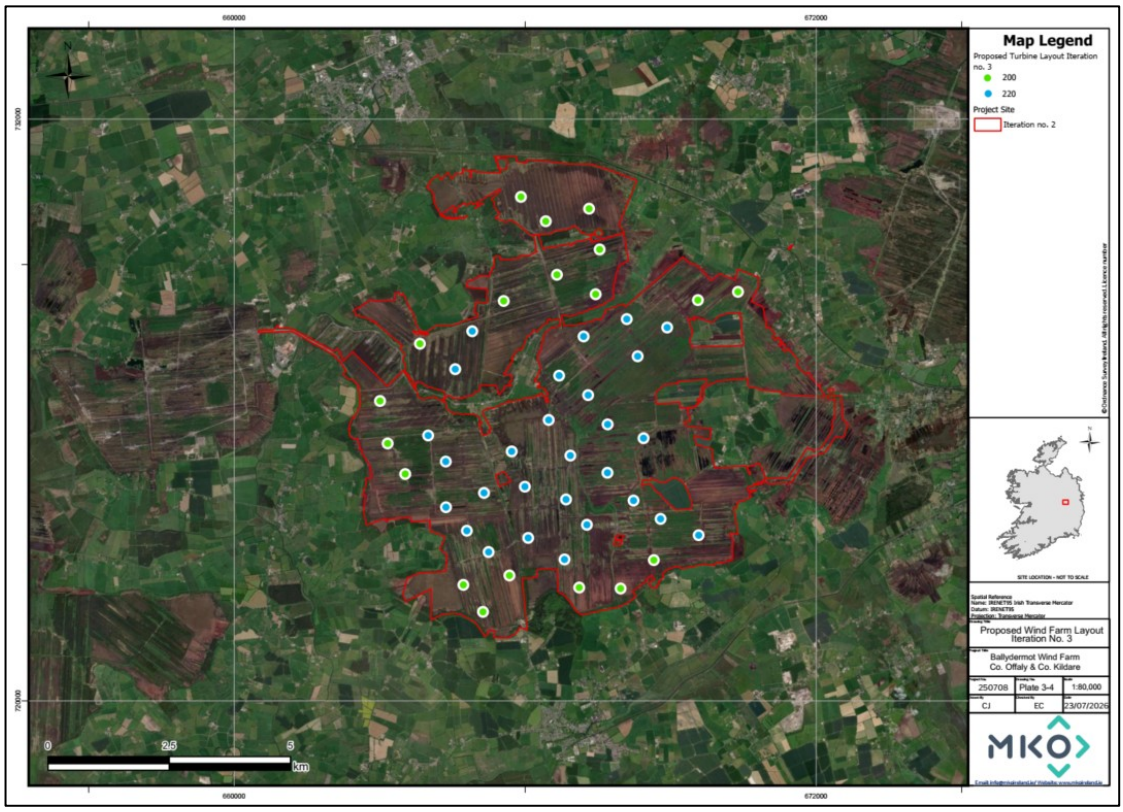


Plate 3-4 Proposed Wind Farm Layout Iteration No. 3

Iteration No. 3 represents the reduced 48 no. turbine layout for the Proposed Wind Farm, with 21 no. turbines having a tip height of 200m and 27 no. turbines having a tip height of 220m following further detailed feasibility assessment on landscape and visual. To reduce the visual impact of the Proposed Turbines, the 220m tip height turbines were only proposed within an 'inner ring' of the site, with the 200m tip height turbines forming an 'outer ring' to increase setback distances between the larger Proposed Turbines and sensitive receptors. This graduated profile reduces the potential for visual dominance and allows the outer turbines to take greater advantage of existing visual screening within the landscape, such as intervening landform and vegetation.

Additional detailed review of the turbine layout determined that the 4 no. turbines locations in the townland of Ticknevin, Co. Kildare should be reviewed due to the Local Authority Designations along the Grand Canal and the recognised recreational resource the Grand Canal offers. Therefore, an 800m buffer was applied to the Grand Canal and 3 no. turbines were microsited to avoid the identified buffer and 1 no. turbine was removed from the Proposed Wind Farm layout.

Proposed Wind Farm Layout Iteration No. 4

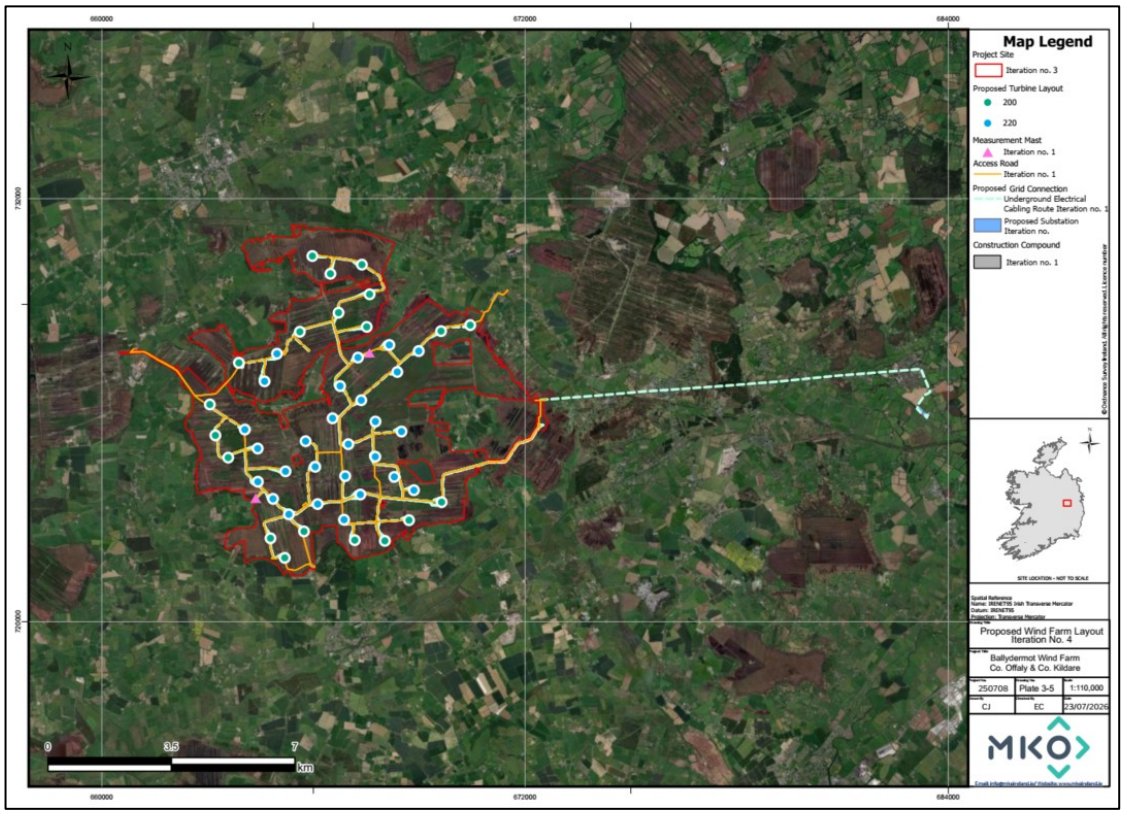


Plate 3-5 Proposed Wind Farm Layout Iteration No. 4

Iteration No. 4 provides for a 47 no. Proposed Turbine layout, accounting for 27 no. turbines having a tip height of 220m and 20 no. turbines having a top height of 200m. The 200m tip height turbines are located on the outer edges of the Proposed Wind Farm to increase setback distances between the larger Proposed Turbines and sensitive receptors. This layout also included initial proposed infrastructure siting of ancillary elements which were not previously considered, such as internal roads, amenity track, temporary construction compounds, and met masts. Enhancement for ecological and ornithological receptors has formed part of detailed design, the Proposed Enhancement Area design evolution is detailed in Section 3.2.5.5 below.

The amenity access track was developed in parallel with the Proposed Wind Farm layout. The amenity network includes walking and cycling routes, along with a dedicated equine track. The draft amenity plan includes for 8 no. waymarked proposed connections linking to surrounding settlements including Killinthomas Wood, the Grand Canal, and BnM lands to the west and proposed connections to neighbouring sites of interest including Lullymore Heritage and Discovery circular trails.

Due to the detailed survey work that was ongoing within the Project Site at this stage, the ancillary elements were designed with due cognisance of all onsite constraints and required setbacks. Further assessments were carried out as this layout was presented to the wider EIAR team for further detailed investigations and assessment. These investigations included detailed archaeological investigations, habitat mapping, ecological surveying, hydrological and geotechnical investigations of the Proposed Wind Farm and detailed aviation assessments (i.e., radar and instrument flight procedure (IFP) assessments) pertaining to the Proposed Turbines.

Proposed Wind Farm Layout Iteration No .5 – Final Proposed Project Layout

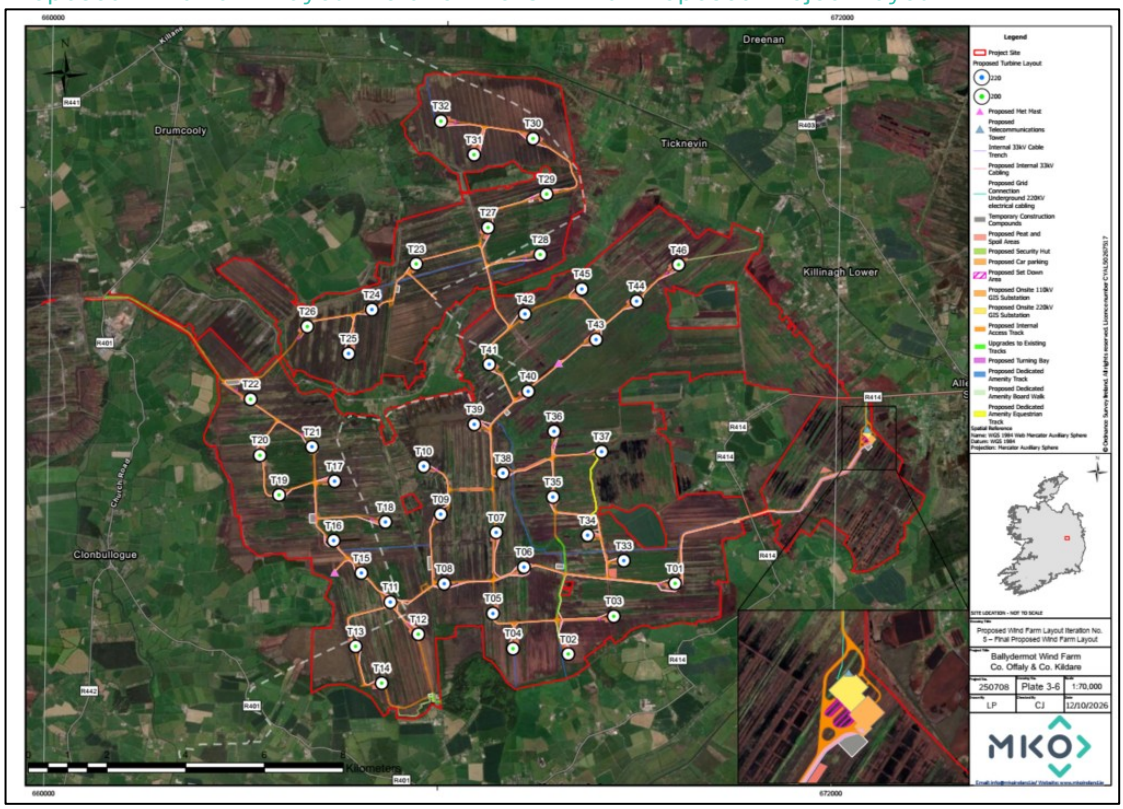


Plate 3-6 Proposed Wind Farm Layout Iteration No. 5 – Final Proposed Wind Farm Layout

Iteration No. 5 as presented in Plate 3-6 above is the final design change and is what constitutes the Proposed Wind Farm. The final layout for the Proposed Wind Farm comprised of 46 no. wind turbines, 19 no. turbines will have a blade tip height of 200 metres (m) above the top of the foundation and 27 no. turbines will have a blade tip height of 220 metres (m) above the top of the foundation, associated foundations and hardstanding areas, including access roads, underground internal cabling, permanent meteorological masts, temporary construction compounds, peat and spoil areas, relay mast, tree felling, site drainage, operational stage signage, amenity access track, car parks and all ancillary works and apparatus.

For the final Proposed Wind Farm layout the following changes were made:

- Removal of 1 no. turbine from the layout to avoid impacts on the Instruments Flight Procedure (IFP) of the Casement Aerodrome (see Section 16.9 of Chapter 16 Aviation)
    - Associated benefits pertaining to landscape and visual, i.e., mitigating effects on residential receptors from relevant viewpoints by creating a more visually coherent view of the Proposed Turbines
- Removal of 1 no. new site entrance on the R401
- Removal of overlap with the Long Derries SAC and the Project Site
- Turbine micrositing to avoid hydrological constraints
- Road realignment to align with turbine micrositing
- Introduction of Proposed Turbine Delivery Route accommodation works areas in Cloncreen Wind Farm, on the R402/R420 junctions, and in Ballinagar, Co. Offaly
- Introduction of a relay mast for Virgin media telecoms links mitigation

The design evolution of the Proposed Grid Connection is outlined in Section 3.2.5.4 below.

The potential environmental effects of previous design iterations in comparison with the final Proposed Wind Farm layout are presented in Table 3-6 below.

Table 3-6 Comparison of environmental effects of previous design iterations when compared against the final 46 no. turbine layout.

Environmental Consideration	Previous design iterations	Chosen Option of the Final 46. No Turbine Layout and all associated infrastructure
Population & Human Health (incl. Shadow Flicker)	Likely potential for increased shadow flicker impacts on nearby sensitive receptors due to the increased number of turbines in Proposed Wind Farm Layout Iteration No. 1 (59 turbine layout), Proposed Wind Farm Layout Iteration No. 2 (50 / 52 turbine layout), Proposed Wind Farm Layout Iteration No. 3 (48 turbine layout), and Proposed Wind Farm Layout Iteration No. 4 (47 turbine layout).	There is no potential for significant shadow flicker effects from the proposed turbines. Shadow flicker effects can be mitigated to meet threshold criteria. Potential for reduced shadow flicker impacts on nearby sensitive receptors due to the reduced number of turbines, greater setbacks from houses, and greater separation between Proposed Turbines. As detailed in Chapter 13 Landscape and Visual, the landscape type and character of the area where the Proposed Turbines are sited comprises peatland landscape types of moderate sensitivity and can effectively accommodate wind energy development. Of the 27 no. VPs assessed 3 no. were deemed not significant, 12 no. were deemed slight, 8 no. were deemed moderate, and 4 no. were deemed significant. The number of receptors experiencing these effects is very low as the landscape surrounding the proposed turbines has a low population density. Visual effects will decrease with distance from the proposed turbines. Based on the assessment detailed in Chapter 5 and Chapter 12, and the mitigation measures proposed, there will be no significant effects on population and human health from shadow flicker and noise and vibration during the construction, operation and decommissioning phases of the Proposed Project.
Biodiversity & Ornithology	Larger development footprint would result in greater potential habitat loss in Proposed Wind Farm Layout Iteration No. 1 (59 turbine layout), Proposed Wind Farm Layout Iteration No. 2 (50 / 52 turbine layout), Proposed Wind Farm Layout Iteration No. 3 (48 turbine layout), and Proposed Wind Farm Layout Iteration No. 4 (47 turbine layout). Greater number of turbines in Proposed Wind Farm Layout Iteration No. 1 (59 turbine layout), Proposed Wind Farm Layout	As detailed above and further in Chapter 6, the Proposed Wind Farm has been designed to avoid or mitigate impacts on biodiversity. The Proposed Project includes for a BMP, providing a local boost to biodiversity and ornithology. Please see Appendix 6-5 for details. With regard to collision risk, s detailed in the Bat Report in Appendix 6-2 of

Environmental Consideration	Previous design iterations	Chosen Option of the Final 46. No Turbine Layout and all associated infrastructure
	Iteration No. 2 (50 / 52 turbine layout), Proposed Wind Farm Layout Iteration No. 3 (48 turbine layout), and Proposed Wind Farm Layout Iteration No. 4 (47 turbine layout). would lead to a greater collision risk for bird and bat species on site.	this EIAR, site-level collision risk for high collision risk bat species with Proposed Turbines was typically Low to Medium. Therefore, there will be no significant effects on bats. As detailed in Chapter 7 Ornithology, the Proposed Project has been designed to avoid or mitigate impacts on ornithological receptors. As detailed in the Collision Risk Assessment (CRA) in Appendix 7-6, there will be significant effects on Golden Plover and breeding Lapwing due to collision risk prior to mitigation being applied. No significant effects will occur post-mitigation.
Land, Soils & Geology	Larger development footprint would have resulted in larger volume of peat and spoil to be excavated and crushed stone to be extracted for construction in Proposed Wind Farm Layout Iteration No. 1 (59 turbine layout) and Proposed Wind Farm Layout Iteration No. 2 (50 / 52 turbine layout), Proposed Wind Farm Layout Iteration No. 3 (48 turbine layout), and Proposed Wind Farm Layout Iteration No. 4 (47 turbine layout).	As detailed in the assessment in Chapter 8, peat, topsoil and subsoil excavation volumes will be managed within the Project Site, and therefore there will be no significant effects on peat, topsoil and subsoil. Geotechnical investigations followed by careful design will lead to no significant environmental impacts. Smaller development footprint leads to a smaller volume of peat and spoil to be excavated and would require less crushed stone to be extracted for construction. The peat and spoil management proposals discussed in Chapter 4 sets out the optimal treatment for peat and spoil excavated/generated on site without creating significant impacts for biodiversity, hydrology, land use, etc.
Geotechnical/Peat Stability	Geotechnical investigations followed by careful design would lead to no significant environmental effects between Proposed Wind Farm layout iterations.	As detailed in Appendix 8-1, the findings of the peat assessment showed that the Project Site has an acceptable margin of safety and is suitable for the development of the Proposed Project.
Water	Larger footprint would result in a greater potential for silt-laden runoff to enter natural watercourses within and around the Project Site for Proposed Wind Farm Layout Iteration No. 1 (59 turbine layout) and Proposed Wind Farm Layout Iteration No. 2 (50 / 52 turbine layout), Proposed Wind Farm Layout Iteration No. 3 (48 turbine layout), and Proposed Wind Farm Layout Iteration No. 4 (47 turbine layout).	As detailed in the assessment in Chapter 9, no significant effects on surface water or groundwater quality will occur.

Environmental Consideration	Previous design iterations	Chosen Option of the Final 46. No Turbine Layout and all associated infrastructure
	Increased potential for impacts on groundwater schemes due to the location of infrastructure. Project design specific drainage design would remove the potential for significant environmental effects.	
Air Quality	More turbines increase the potential to maximise the use of the site wind resource and the opportunity to further reduce the country's dependence on fossil fuels. However, there would be an increased potential for impacts on air quality due to increased vehicle emissions and dust emissions as a result of increased volumes of material and turbine component deliveries required to facilitate the construction of the Proposed Wind Farm Layout Iteration No. 1 (59 turbine layout) and Proposed Wind Farm Layout Iteration No. 2 (50 / 52 turbine layout), Proposed Wind Farm Layout Iteration No. 3 (48 turbine layout), and Proposed Wind Farm Layout Iteration No. 4 (47 turbine layout).	As detailed in Chapter 10, there will be no significant effects on air quality.
Climate	A larger number of turbines could result in a greater amount of exhaust emissions from construction vehicles and plant and the transport of materials and workers to/from the site of Proposed Wind Farm Layout Iteration No. 1 (59 turbine layout) and Proposed Wind Farm Layout Iteration No. 2 (50 / 52 turbine layout), Proposed Wind Farm Layout Iteration No. 3 (48 turbine layout), and Proposed Wind Farm Layout Iteration No. 4 (47 turbine layout). A larger number of turbines could result in a higher MW output in the operational phase which would result in a greater amount of carbon savings for Proposed Wind Farm Layout Iteration No. 1 (59 turbine layout) and Proposed Wind Farm Layout Iteration No. 2 (50 / 52 turbine layout), Proposed Wind Farm Layout Iteration No. 3 (48 turbine layout), and Proposed Wind Farm Layout Iteration No. 4 (47 turbine layout).	As detailed in the assessment in Chapter 11, over the proposed 35-year lifetime of the Proposed Wind Farm, 5,139,995 tonnes of carbon dioxide will be displaced from traditional carbon-based electricity generation. The addition of an estimated 322MW clean energy to the national grid will be a positive contribution to the State's renewable energy targets set out in CAP25.
Noise & Vibration	A larger number of turbines could have a greater noise impact Proposed Wind Farm Layout Iteration No. 1 (59 turbine layout) and Proposed Wind Farm Layout Iteration No. 2 (50 / 52 turbine layout), Proposed Wind Farm Layout Iteration No. 3 (48	Based on the assessment detailed in Chapter 12 and the mitigation measures proposed, there will be no significant effects on sensitive receptors due to an increase in noise levels from

Environmental Consideration	Previous design iterations	Chosen Option of the Final 46. No Turbine Layout and all associated infrastructure
	turbine layout), and Proposed Wind Farm Layout Iteration No. 4 (47 turbine layout).	the Proposed Project during the construction and operational phase.
Landscape & Visual	A larger number of turbines could have a greater visual impact for Proposed Wind Farm Layout Iteration No. 1 (59 turbine layout) and Proposed Wind Farm Layout Iteration No. 2 (50 / 52 turbine layout), Proposed Wind Farm Layout Iteration No. 3 (48 turbine layout), and Proposed Wind Farm Layout Iteration No. 4 (47 turbine layout).	The smaller number of proposed turbines ensures a setback exceeding that required in the Draft WEDG 2019. As detailed in Chapter 13 Landscape and Visual, the landscape type and character of the area where the Proposed Turbines are sited comprises peatland landscape types of moderate sensitivity and can effectively accommodate wind energy development. Of the 27 no. VPs assessed 3 no. were deemed not significant, 12 no. were deemed slight, 8 no. were deemed moderate, and 4 no. were deemed significant. The number of receptors experiencing these effects is very low as the landscape surrounding the proposed turbines has a low population density. Visual effects will decrease with distance from the proposed turbines.
Cultural Heritage	A larger number of turbines and associated infrastructure could have a greater impact on unrecorded subsurface archaeology for Proposed Wind Farm Layout Iteration No. 1 (59 turbine layout) and Proposed Wind Farm Layout Iteration No. 2 (50 / 52 turbine layout), Proposed Wind Farm Layout Iteration No. 3 (48 turbine layout), and Proposed Wind Farm Layout Iteration No. 4 (47 turbine layout).	As detailed in the assessment in Chapter 14, there will be no significant effects on known or unknown archaeology and cultural heritage during the construction, operation and decommissioning phases.
Material Assets – 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 for Proposed Wind Farm Layout Iteration No. 1 (59 turbine layout) and Proposed Wind Farm Layout Iteration No. 2 (50 / 52 turbine layout), Proposed Wind Farm Layout Iteration No. 3 (48 turbine layout), and Proposed Wind Farm Layout Iteration No. 4 (47 turbine layout).	As detailed in Chapter 15, there will be no significant effects on traffic volumes during the construction phase of the Proposed Project. A detailed Traffic Management Plan (Appendix 15-2) incorporating all the mitigation measures will be agreed with the roads authority prior to construction works commencing onsite.
Material Assets – Utilities, Waste Management, and Telecommunications	No material difference between the Proposed Wind Farm Layout Iteration no. 1, 2, 3, and 4 for gas, water, waste management, and telecommunications.	No material difference between the Proposed Wind Farm Layout Iteration no. 1, 2, 3, and 4 for gas, water, waste management, and telecommunications.

Environmental Consideration	Previous design iterations	Chosen Option of the Final 46. No Turbine Layout and all associated infrastructure
Aviation	No material difference between the Proposed Wind Farm Layout Iteration no. 1, 2, 3, and 4 for aviation.	As detailed in Chapter 16, there will be a significant negative effect on the Edenderry Low Flying Training Area (LFTA). The Applicant is open to engaging with the DoD in relation to an agreement to move the low flying area to an alternative suitable area; should a suitable area be identified and agreed there will be no significant effect on LFTAs due to the Proposed Project. Further information on the Edenderry LFTA is detailed in Section 16.7.2.2 of Chapter 16. No other significant effects will occur on aviation during the construction, operational, and decommissioning phases of the Proposed Project.
Major Accidents and Natural Disasters	A larger number of turbines could have a greater potential risk relating to major accidents and natural disasters for the Proposed Wind Farm Layout Iteration No. 1 (59 turbine layout) and Proposed Wind Farm Layout Iteration No. 2 (50 / 52 turbine layout), Proposed Wind Farm Layout Iteration No. 3 (48 turbine layout), and Proposed Wind Farm Layout Iteration No. 4 (47 turbine layout).	As detailed in Chapter 17 the risk of a major accident and/or disaster during the construction of the Proposed Project is considered 'low'. The highest risk scenarios to the Proposed Project (i.e., contamination, fire/explosion, and aviation) are considered unlikely to occur at any phase of the Proposed Project. A detailed risk assessment on potential risks relating to major accidents and natural disasters is provided in Section 17.4 of Chapter 17 of this EIAR.

3.2.5.3.3 Alternative Internal Road Layout

Internal roads are required onsite to enable transport of infrastructure and construction materials within the Project Site. Such roads must be of a gradient and width sufficient to allow safe movement of equipment and vehicles. As the turbine layout was finalised, the most suitable routes between each component of the Proposed Project were identified, taking into account the shortest routes, existing access tracks, filtering out the physical and environmental constraints of the Project Site and utilising the most direct route between turbines in order to minimise the footprint.

The Proposed Wind Farm site currently includes machine passes that were used to previously for peat extraction activities; all railways have been decommissioned as per the requirements of the IPC Licence. Due to their current low load-bearing capability, these machine passes and railway beds are not considered suitable for turbine component delivery or the various wind farm construction machinery. Therefore, new internal roads are required for suitable access and linkages between the various project elements, and efficient and safe movement of vehicles around the Project Site by applying the required vehicle turning radii. Where possible, the new internal road network follows the existing machine passes. The internal road layout was adjusted relative to new turbine locations with each revision of the turbine layout with the existing road layout utilised where appropriate.

Passing bays were designed for selected locations along the internal roads. These bays were located in specific areas to ensure minimum environmental effect by locating the passing bays away from higher

value habitat and also in a configuration that facilitates the design of the amenity pathways/cycleways. Finally, amenity access tracks were added to the Proposed Wind Farm to enhance connectivity to the surrounding settlements and sites / areas of interest. These include the towns / villages of Edenderry, Allenwood, Lullymore, Rathangan and Clonbullogue.

3.2.5.4 Alternative Substation and Grid Connection

3.2.5.4.1 *Proposed Grid Connection electrical cabling route*

A total of 5 no. electrical 220kV cable route options were assessed for the Proposed Project. Post preliminary wind farm design, the grid infrastructure in and around the Project Site was assessed.

A key consideration in determining the grid connection method for a proposed wind energy development is whether the cabling is underground or run as an overhead line (OHL) or a combination thereof. An alternative to the use of both underground cabling and OHL (looped cabling) would be to construct an approx. 25.3km underground cable connection to the Maynooth Substation, Co. Kildare. While the WEDG 2006 indicate that underground cables are the preferred option for connection of a wind energy development to the national grid, it was determined that due to the proximity of the existing OHL, it was more environmentally prudent to connect the Proposed Wind Farm to the national grid via 13.1 km of underground cable and 0.12km of 'loop-in' overhead line cabling connecting into the existing Maynooth-Dunstown 220kV OHL.

An assessment was carried out by the Applicant on the surrounding grid infrastructure and associated possible connection route options for the Proposed Wind Farm.

The grid connections that were potentially viable options were assessed, the assessment identified 5 no. potential connections for the Proposed Wind Farm to the national grid, such as:

- Canal Barrow Line –c.18km underground cabling connecting into on offsite substation and requiring an OHL connection into the existing Maynooth-Dunstown 220kV OHL;
- Canal Main Line – c.16km underground cabling connecting into on offsite substation and requiring an OHL connection into the existing Maynooth-Dunstown 220kV OHL;
- Minor Roads – c.19km underground cabling connecting into on offsite substation and requiring an OHL connection into the existing Maynooth-Dunstown 220kV OHL;
- R403 – c.15km underground cabling connecting into on offsite substation and requiring an OHL connection into the existing Maynooth-Dunstown 220kV OHL; and
- Timahoe – c.16km underground cabling connecting into on offsite substation and requiring an OHL connection into the existing Maynooth-Derryion 110kV OHL.

The above connection methods were assessed by AECOM (2022) and the options were ranked based on economic, technical, and environmental considerations; options were refined with due consideration being given to the following:

- Low level of public support for overhead lines;
- Proximity to the Proposed Project;
- Additional off-site land take;
- Require routing through private lands;
- Environmental constraints relating to ecology, cultural heritage, hydrology and geology; and
- Technical performance criteria.

The assessment concluded that the c. 13.1km underground connection to an offsite substation with an OHL connection into the existing Maynooth-Dunstown 220kV OHL was the best option from an economic, technical, and environmental perspective.

Section 3.2.5.4.2 and Section 3.2.5.4.3 below outline the alternative grid connection routes and alternative substation locations.

3.2.5.4.2 *Proposed Grid Connection electrical cabling route Alternatives*

Proposed Grid Connection electrical cabling route Alternative 1

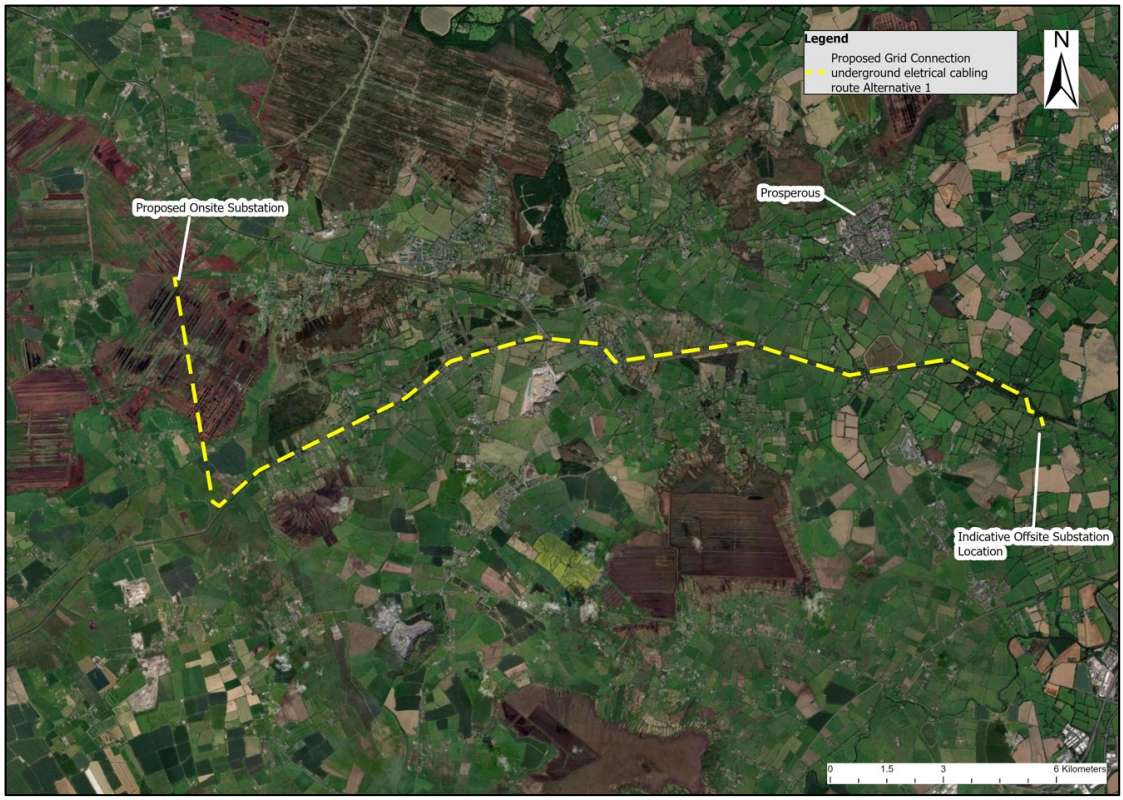


Plate 3-7 Proposed Grid Connection electrical cabling route Alternative 1. Source: AECOM

Proposed Grid Connection electrical cabling route Alternative 1, shown on Plate 3-7 above, requires the use of approximately 18km of underground electrical cabling to connect into a remote offsite substation location and connect into the national grid via the existing Maynooth-Dunstown 220kV OHL.

Proposed Grid Connection electrical cabling route Alternative 1 would pass through Robertstown Village, Co. Kildare and largely follows the route of the Grand Canal Barrow Line (i.e., located primarily within the Grand canal pNHA).

Key constraints along Proposed Grid Connection electrical cabling route Alternative 1 are:

- Second longest route assessed (i.e., 18km)
- 2.5km of the route is located within peatland
- Road widths are narrow throughout the entirety of the route and would result in road closures during the construction phase
- 3 no. river crossings
- 1 no. bridge crossing
- 3 no. horizontal directional drilling (HDD) crossings
- Presence of existing utilities within the route (i.e., watermains and existing wastewater and surface water drainage networks in Robertstown, Co. Kildare)

- Interaction with 6 no. NIAH building along the route
- 2 km of the route located within the Robertstown Public Water Supply

Due to the above interactions and potential environmental impacts, Proposed Grid Connection electrical cabling route Alternative 1 was not progressed for further assessment.

Proposed Grid Connection electrical cabling route Alternative 2



Plate 3-8 Proposed Grid Connection electrical cabling route Alternative 2. Source: AECOM

Proposed Grid Connection electrical cabling route Alternative 2, shown on Plate 3-8 above, requires the use of approximately 16km of underground electrical cabling to connect into a remote offsite substation location and connect into the national grid via the existing Maynooth-Dunstown 220kV OHL. The route follows the Grand Canal Main line to the south of Allenwood, continues along the Grand Canal Main Line through Robertstown before terminating just west of Digby Bridge.

Key constraints along Proposed Grid Connection electrical cabling route Alternative 2 are:

- Third longest route assessed (i.e., 16km)
- 0.5km of the route is located within peatland
- Road widths are narrow throughout the entirety of the route and would result in road closures during the construction phase
- 1 no. river crossings and 2 no. stream crossings
- 3 no. locations requiring HDD
- Presence of existing utilities within the route (i.e., watermains and existing wastewater and surface water drainage networks in Robertstown Co. Kildare)
- Interaction with 6 no. NIAH building along the route
- 2 km of the route located within the Robertstown Public Water Supply

Due to the above interactions and potential environmental impacts, Proposed Grid Connection electrical cabling route Alternative 2 was not progressed for further assessment.

Proposed Grid Connection electrical cabling route Alternative 3

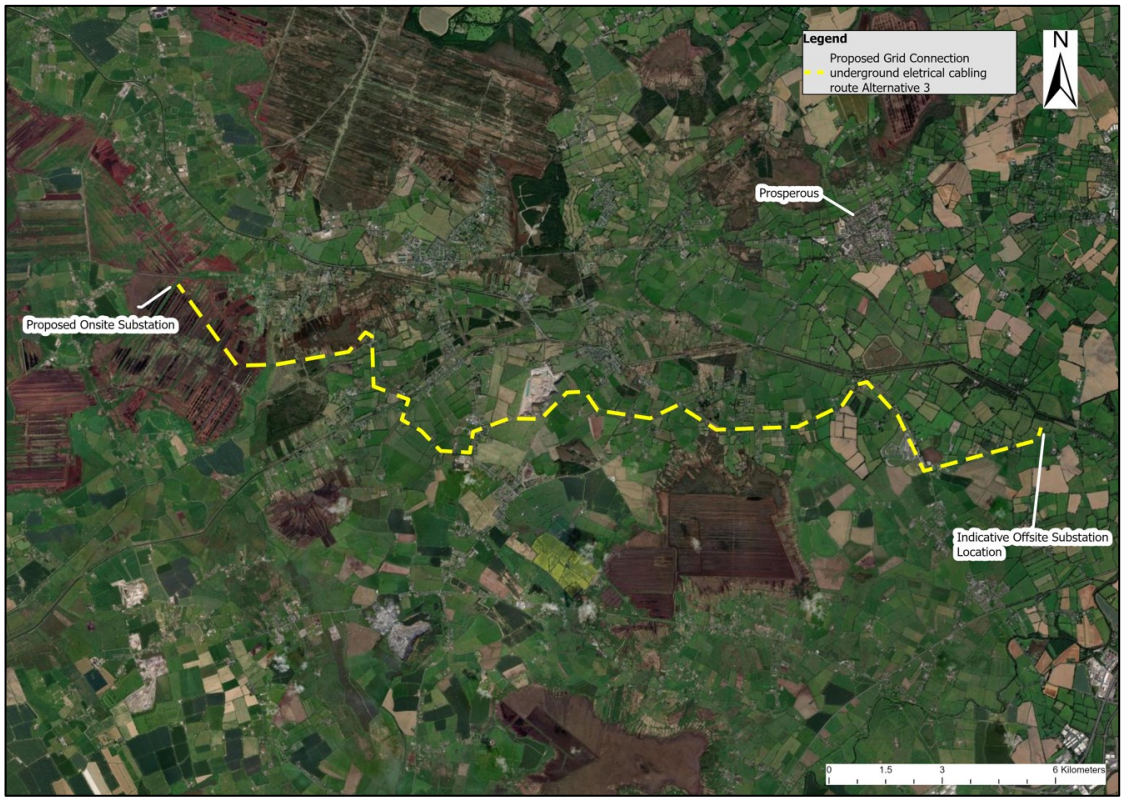


Plate 3-9 Proposed Grid Connection electrical cabling route Alternative 3. Source: AECOM

Proposed Grid Connection electrical cabling route Alternative 3, shown on Plate 3-9 above, requires the use of approximately 19km of underground electrical cabling to connect into a remote offsite substation location and connect into the national grid via the existing Maynooth-Dunstown 220kV OHL.

Proposed Grid Connection electrical cabling route Alternative 3 consists of a series of minor roads and has an approximate length of 19km. The route would travel along internal roads to the south of the Project Site towards Ballyteague, Co. Kildare from there the route passes to the north of Kilmeade and along the R415. The route travels to the southwest of Robertstown via the L7078 and on to the R409, then from Carragh along the L6008 and towards the approximate location of the offsite substation.

Key constraints along Proposed Grid Connection electrical cabling route Alterative 3 are:

- Longest route assessed (i.e., 19km)
- 2km of the route is located within peatland
- Road widths are narrow throughout the entirety of the route and would result in road closures during the construction phase
- Large number of sharp bends along the road requiring upgrade
- 4 no. river crossings
- 4 no. locations requiring HDD
- Presence of existing utilities within the route (i.e., watermains and existing EirGrid infrastructure)
- Interaction with the Grand Canal pNHA at 3 no. locations
- Interaction with 2 no. NIAH building along the route
- 1.7 km of the route located within the Robertstown Public Water Supply

Due to the above interactions and potential environmental effects, Proposed Grid Connection electrical cabling route Alternative 3 was not progressed for further assessment.

Proposed Grid Connection electrical cabling route Alternative 4

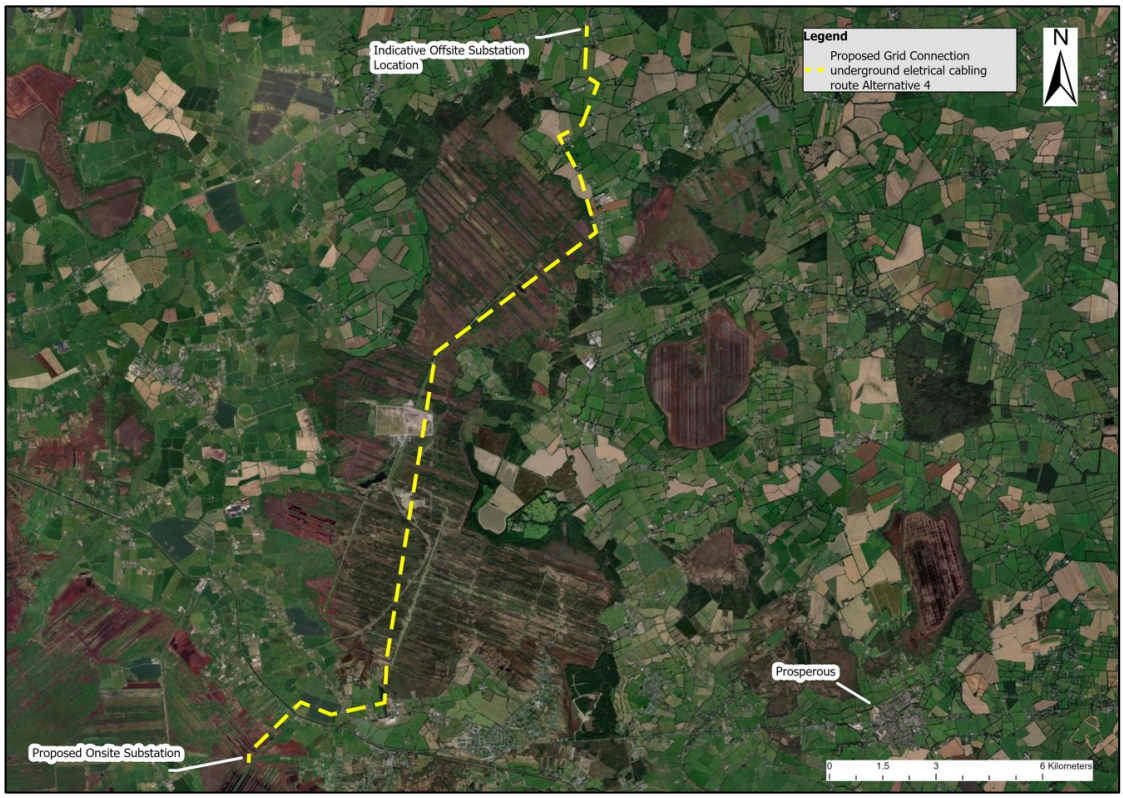


Plate 3-10 Proposed Grid Connection electrical cabling route Alternative 4. Source: AECOM

Proposed Grid Connection electrical cabling route Alternative 4, shown on Plate 3-10 above, requires the use of approximately 16km of underground electrical cabling to connect into a remote offsite substation location and connect into the national grid via the existing Maynooth-Derryion 110kV OHL.

Proposed Grid Connection Alternative 4 travels north from the Project Site through Allenwood Co. Kildare and passes through Timahoe Bog towards the approximate location of the offsite substation.

Key constraints along Proposed Grid Connection electrical cabling route Alternative 4 are:

- Third longest route assessed (i.e., 16km)
- 9km of the route is located within peatland
- Road widths are narrow throughout the entirety of the route and would result in road closures during the construction phase
- Large number of sharp bends along the road requiring upgrade
- 2 no. river crossings
- 1 no. locations requiring HDD
- Presence of existing utilities within the route (i.e., watermains (distribution mains and trunk mains) and existing EirGrid infrastructure)
- Interaction with 1 no. national monument and 3 no. sites and monuments records (SMR)

Due to the above interactions and potential environmental effects, Proposed Grid Connection electrical cabling route Alternative 4 was not progressed for further assessment.

Proposed Grid Connection electrical cabling route Alternative 5

The preliminary grid assessment report provided by AECOM outlined an additional route for assessment (Proposed Grid Connection electrical cabling route Alternative 5), shown on Plate 3-11

below, which requires the use of approximately 15km of underground electrical cabling to connect into a remote offsite substation location and connect into the national grid via the existing Maynooth-Dunstown 220kV OHL.

Proposed Grid Connection electrical cabling route Alternative 5 follows along the R403 road from the Project Site east towards Prosperous, Co. Kildare. The proposed route travels east along the R403 for approximately 13km and then travels south towards the approximate location of the offsite substation.

Key constraints along Proposed Grid Connection electrical cabling route Alterative 5 are:

- Shortest route assessed (i.e., 15km)
- 0.5km of the route is located within peatland
- 10 no. watercourse crossings
- 1 no. locations requiring HDD
- Presence of existing utilities within the route (i.e., watermains, EirGrid infrastructure, gas lines, and existing wastewater and surface water drainage networks in Prosperous and Allenwood Co. Kildare)

Proposed Grid Connection electrical cabling route Alternative 5 was deemed the most suitable connection route and was progressed for further assessment.

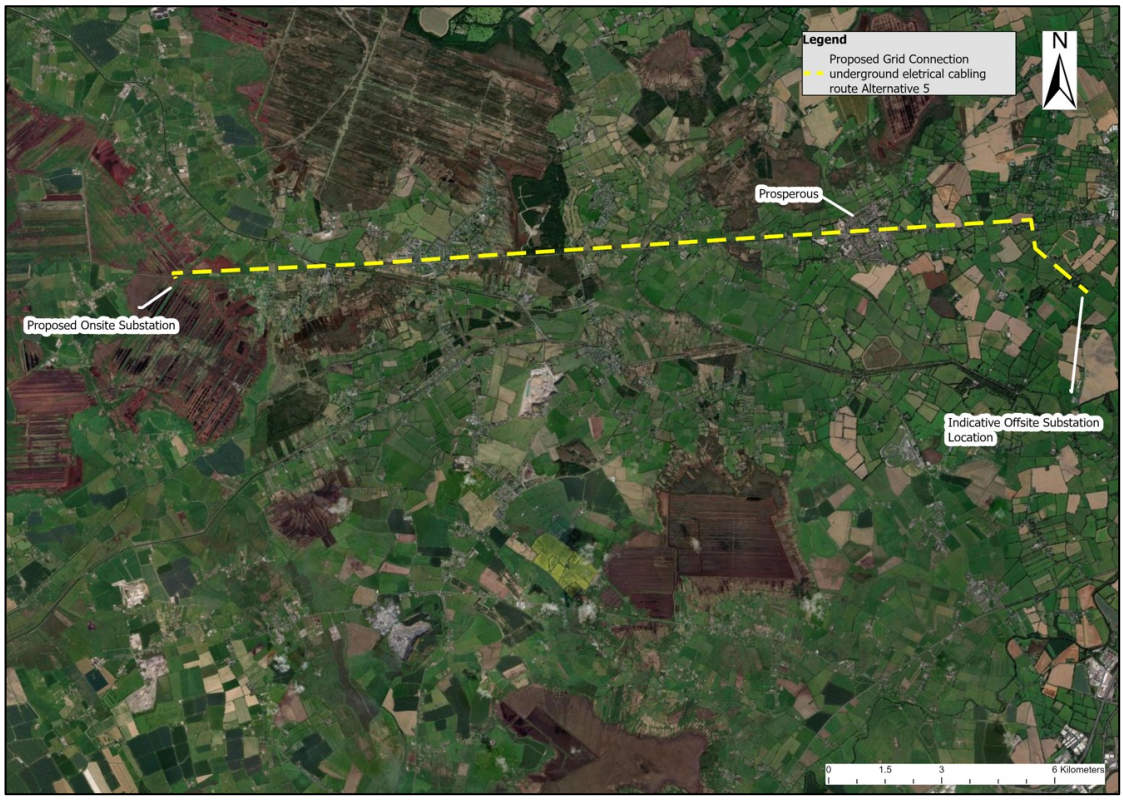


Plate 3-11 Proposed Grid Connection electrical cabling route Alternative 5. Source: AECOM

Final Proposed Grid Connection electrical cabling route Layout

After further detailed assessment by the project team, the design of Proposed Grid Connection underground electrical cabling route Alternative 5 was refined after EirGrid upgraded a section of OHL to facilitate additional capacity enabling the appropriate grid connection infrastructure required to connect the Proposed Wind Farm to the national grid. The final design included for a 13.1km underground electrical cabling route from the Proposed Onsite Substation to the Proposed Offsite Substation (see Section 3.2.5.4.2 below for details on the Proposed Onsite Substation and Proposed

Offsite Substation siting) and 0.12km of looped OHL connecting into the existing Maynooth-Dunstown 220kV OHL.

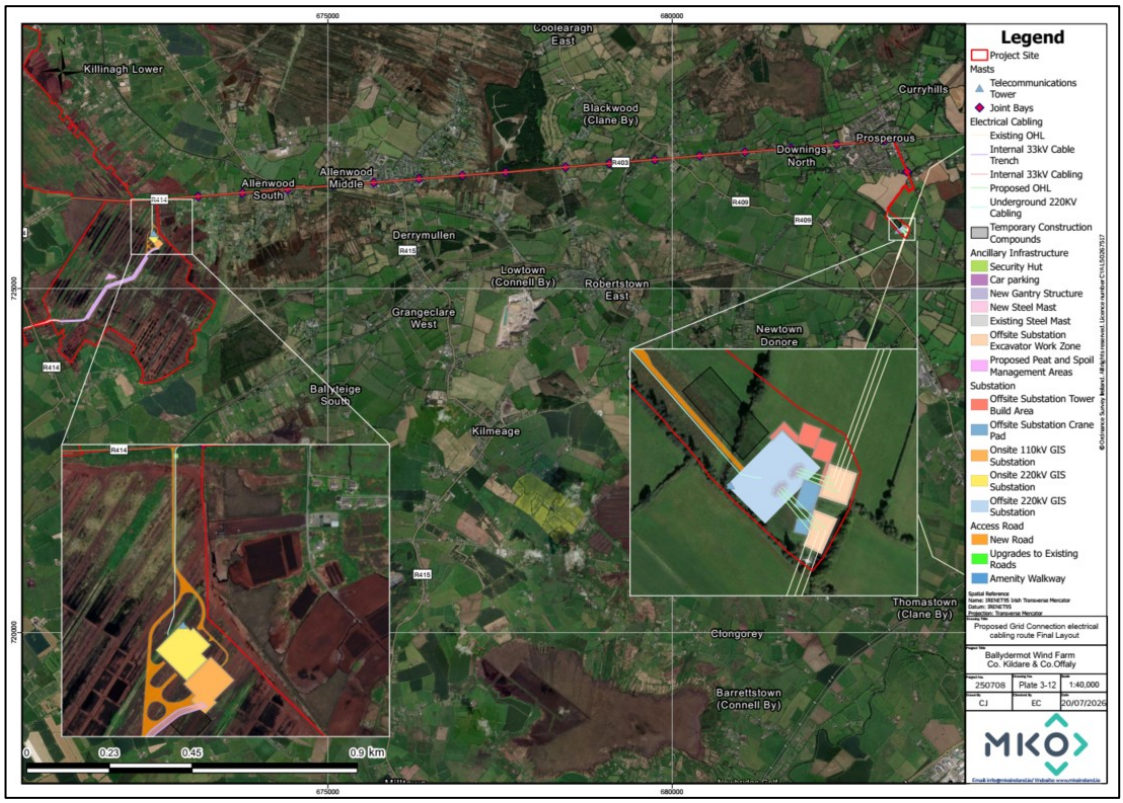


Plate 3-12 Proposed Grid Connection electrical cabling route Final Layout

The final Proposed Grid Connection electrical cabling route layout, shown in Plate 3-12 above, comprised the Proposed Onsite Substation and associated telecommunications tower, associated 13.1km of underground electrical cabling, Proposed Offsite Substation and associated telecommunications tower, 0.12km of OHL cabling into the existing Maynooth-Dunstown 220kV OHL, 2 no, new steel masts, 2 no. gantry structures, 2 no. crane pads and 2 no. tower pads and all ancillary infrastructure.

A comparison of the potential environmental effects of the proposed alternative substation locations, as compared against the Final Proposed Grid Connection Layout are presented in Table 3-7 below.

Table 3-7 Comparison of environmental effects of previous design iterations when compared against the final Proposed Grid Connection layout.

Environmental Consideration	Proposed Grid Connection Alternative 1	Proposed Grid Connection Alternative 2	Proposed Grid Connection Alternative 3	Proposed Grid Connection Alternative 4	Final iteration for Proposed Grid Connection layout and all associated infrastructure
Population & Human Health	Visual impacts are neutral from Proposed Grid Connection Alternative 1.	Visual impacts are neutral from Proposed Grid Connection Alternative 2.	Visual impacts are neutral from Proposed Grid Connection Alternative 3.	Visual impacts are neutral from Proposed Grid Connection Alternative 4.	Based on the assessment detailed in Chapter 5, Chapter 12, and the mitigation measures proposed, there will be no significant effects on population and human health from shadow flicker and noise and vibration during the construction, operation and decommissioning phases of the Proposed Project.
Biodiversity & Ornithology	Potential for increased habitat loss due to the 2.5km of cabling associated with Proposed Grid Connection Alternative 1 being located within peatland.	Potential for increased habitat loss due to the 0.5km of cabling associated with Proposed Grid Connection Alternative 2 being located within peatland.	Potential for increased habitat loss due to the 2km of cabling associated with Proposed Grid Connection Alternative 3 being located within peatland.	Potential for increased habitat loss due to the 9km of cabling associated with Proposed Grid Connection Alternative 4 being located within peatland.	As detailed in Chapter 6, the Proposed Grid Connection has been designed to avoid or mitigate impacts on biodiversity. The Proposed Project includes for a BMP (Appendix 6-5) proposal providing a local boost to biodiversity, birds, and water quality. As detailed in Chapter 7, the Proposed Grid Connection has been designed to avoid or mitigate impacts on ornithological receptors.

Environmental Consideration	Proposed Grid Connection Alternative 1	Proposed Grid Connection Alternative 2	Proposed Grid Connection Alternative 3	Proposed Grid Connection Alternative 4	Final iteration for Proposed Grid Connection layout and all associated infrastructure
Land, Soils & Geology	Potential for larger impact on land soils and geology due to the length of underground cable (approximately 18km) and associated require excavation and storage of all material associated with the underground cable route and the required infrastructure to connect into the existing OHL for Proposed Grid Connection Alternative 1.	Potential for larger impact on land soils and geology due to the length of underground cable (approximately 16km) and associated require excavation and storage of all material associated with the underground cable route and the required infrastructure to connect into the existing OHL for Proposed Grid Connection Alternative 2.	Potential for larger impact on land soils and geology due to the length of underground cable (approximately 19km) and associated require excavation and storage of all material associated with the underground cable route and the required infrastructure to connect into the existing OHL for Proposed Grid Connection Alternative 3.	Potential for larger impact on land soils and geology due to the length of underground cable (approximately 16km) and associated require excavation and storage of all material associated with the underground cable route and the required infrastructure to connect into the existing OHL for Proposed Grid Connection Alternative 4.	As detailed in the assessment in Chapter 8, peat, topsoil and subsoil excavation volumes will be managed within the site, and therefore there will be no significant effects on peat, topsoil and subsoil. Geotechnical investigations followed by careful design will lead to no significant environmental impacts. The peat and spoil management proposals discussed in Chapter 4 sets out the optimal treatment for peat and spoil excavated/generated on site without creating significant impacts for biodiversity, hydrology, land use, etc.
Geotechnical/ Peat Stability	Geotechnical investigations followed by careful design would lead to no significant environmental impacts between Proposed Grid Connection layout iterations.	Geotechnical investigations followed by careful design would lead to no significant environmental impacts between Proposed Grid Connection layout iterations.	Geotechnical investigations followed by careful design would lead to no significant environmental impacts between Proposed Grid Connection layout iterations.	Geotechnical investigations followed by careful design would lead to no significant environmental impacts between Proposed Grid Connection layout iterations.	As detailed in Appendix 8-1, the findings of the peat assessment showed that the Project Site has an acceptable margin of safety and is suitable for the development of the Proposed Project.
Water	Potential for greater impact on sensitive hydrological receptors	Potential for greater impact on sensitive hydrological receptors	Potential for greater impact on sensitive hydrological receptors	Effects on water are neutral between Proposed Grid	As detailed in the assessment in Chapter 9, no significant effects

Environmental Consideration	Proposed Grid Connection Alternative 1	Proposed Grid Connection Alternative 2	Proposed Grid Connection Alternative 3	Proposed Grid Connection Alternative 4	Final iteration for Proposed Grid Connection layout and all associated infrastructure
	due to number of river and bridge crossing locations along Proposed Grid Connection Alternative 1.	due to HDD works required at 3 no. locations along Proposed Grid Connection Alternative 2.	due to number of river and crossings and required HDD works along Proposed Grid Connection Alternative 3.	Connection Alternative 4 and the Final Proposed Grid Connection due to HDD requirements being the same across both layouts.	on surface water or groundwater quality will occur.
Air Quality	Potential for greater impacts on air quality due to required excavation associated with the underground electrical cable route and required infrastructure to connect into the existing OHL for Proposed Grid Connection Alternative 1.	Potential for greater impacts on air quality due to required excavation associated with the underground electrical cable route and required infrastructure to connect into the existing OHL for Proposed Grid Connection Alternative 2.	Potential for greater impacts on air quality due to required excavation associated with the underground electrical cable route and required infrastructure to connect into the existing OHL for Proposed Grid Connection Alternative 3.	Potential for greater impacts on air quality due to required excavation associated with the underground electrical cable route and required infrastructure to connect into the existing OHL for Proposed Grid Connection Alternative 4.	As detailed in Chapter 10, the Proposed Project will have a long-term, significant, positive effect on air quality during the operational phase.
Climate	Potential for greater impacts on climate due to required excavation associated with the underground electrical cable route and required infrastructure to connect into the existing OHL for Proposed Grid Connection Alternative 1.	Potential for greater impacts on climate due to required excavation associated with the underground electrical cable route and required infrastructure to connect into the existing OHL for Proposed Grid Connection Alternative 2.	Potential for greater impacts on climate due to required excavation associated with the underground electrical cable route and required infrastructure to connect into the existing OHL for Proposed Grid Connection Alternative 3.	Potential for greater impacts on climate due to required excavation associated with the underground electrical cable route and required infrastructure to connect into the existing OHL for Proposed Grid Connection Alternative 4.	As detailed in the assessment in Chapter 11, the Proposed Project will have a long-term significant positive effect on climate during the operational phase.
Noise & Vibration	Potential for increased noise impacts on sensitive noise receptors due to the length of underground cable (approximately 18km) and associated require excavation and storage of all material associated with the	Potential for increased noise impacts on sensitive noise receptors due to the length of underground cable (approximately 16km) and associated require excavation and storage of all material associated with the	Potential for increased noise impacts on sensitive noise receptors due to the length of underground cable (approximately 19km) and associated require excavation and storage of all material associated with the	Potential for increased noise impacts on sensitive noise receptors due to the length of underground cable (approximately 16km) and associated require excavation and storage of all material associated with the	Based on the assessment detailed in Chapter 12 and the mitigation measures proposed, there will be no significant effects on sensitive receptors due to an increase in noise levels from the Proposed Grid Connection during the

Environmental Consideration	Proposed Grid Connection Alternative 1	Proposed Grid Connection Alternative 2	Proposed Grid Connection Alternative 3	Proposed Grid Connection Alternative 4	Final iteration for Proposed Grid Connection layout and all associated infrastructure
	underground cable route and the required infrastructure to connect into the existing OHL for Proposed Grid Connection Alternative 1.	underground cable route and the required infrastructure to connect into the existing OHL for Proposed Grid Connection Alternative 2.	underground cable route and the required infrastructure to connect into the existing OHL for Proposed Grid Connection Alternative 3.	underground cable route and the required infrastructure to connect into the existing OHL for Proposed Grid Connection Alternative 4.	construction and operational phase.
Landscape & Visual	Visual impacts are neutral from Proposed Grid Connection Alternative 1.	Visual impacts are neutral from Proposed Grid Connection Alternative 2.	Visual impacts are neutral from Proposed Grid Connection Alternative 3.	Visual impacts are neutral from Proposed Grid Connection Alternative 4.	As detailed in Chapter 13 Landscape and Visual, the landscape type and character of the area where the Proposed Turbines are sited comprises peatland landscape types of moderate sensitivity and can effectively accommodate wind energy development. Of the 27 no. VPs assessed 3 no. were deemed not significant, 12 no. were deemed slight, 8 no. were deemed moderate, and 4 no. were deemed significant. The number of receptors experiencing these effects is very low as the landscape surrounding the proposed turbines has a low population density. Visual effects will decrease with distance from the proposed turbines.
Cultural Heritage	Larger potential to impact on unknown subsurface archaeology during grid	Larger potential to impact on unknown subsurface archaeology during grid	Larger potential to impact on unknown subsurface archaeology during grid	Larger potential to impact on unknown subsurface archaeology during grid	As detailed in Chapter 14, the Proposed Project has been designed to avoid or mitigate

Environmental Consideration	Proposed Grid Connection Alternative 1	Proposed Grid Connection Alternative 2	Proposed Grid Connection Alternative 3	Proposed Grid Connection Alternative 4	Final iteration for Proposed Grid Connection layout and all associated infrastructure
	connection build out phase due to larger footprint requirements in Proposed Grid Connection Alternative 1	connection build out phase due to larger footprint requirements in Proposed Grid Connection Alternative 2	connection build out phase due to larger footprint requirements in Proposed Grid Connection Alternative 3	connection build out phase due to larger footprint requirements in Proposed Grid Connection Alternative 4	impacts on cultural heritage. There will therefore be no significant effects on cultural heritage.
Material Assets - Traffic	Increased potential for impact on road infrastructure due to narrow road carriage ways and associated road closure requirements.	Increased potential for impact on road infrastructure due to narrow road carriage ways and associated road closure requirements.	Increased potential for impact on road infrastructure due to narrow road carriage ways and associated road closure requirements.	Increased potential for impact on road infrastructure due to narrow road carriage ways and associated road closure requirements.	As detailed in the assessment in Chapter 15, no significant effects on traffic will occur.
Material Assets- Utilities, Waste Management, and Telecommunications	No material difference between the options in potential for impact on gas, water, or telecommunications.	No material difference between the options in potential for impact on gas, water, or telecommunications.	No material difference between the options in potential for impact on gas, water, or telecommunications.	No material difference between the options in potential for impact on gas, water, or telecommunications.	No material difference between the options in potential for impact on gas, water, or telecommunications.
Aviation	No material difference between the options in potential for impact on aviation assets.	No material difference between the options in potential for impact on aviation assets.	No material difference between the options in potential for impact on aviation assets.	No material difference between the options in potential for impact on aviation assets.	As detailed in Chapter 16, there will be a significant negative effect on the Edenderry Low Flying Training Area (LFTA). Should an agreement be made with the DoD to move the low flying area to an alternative suitable area, there will be no significant effect on LFTAs due to the Proposed Project. Further information on the Edenderry LFTA is detailed in Section 16.10.3.2 of Chapter 16. No

Environmental Consideration	Proposed Grid Connection Alternative 1	Proposed Grid Connection Alternative 2	Proposed Grid Connection Alternative 3	Proposed Grid Connection Alternative 4	Final iteration for Proposed Grid Connection layout and all associated infrastructure
					other significant effects will occur on aviation during the construction, operational, and decommissioning phases of the Proposed Project
Major Accidents and Natural Disasters	Required excavations for 18km of underground cabling could have a greater potential risk relating to major accidents and natural disasters for Proposed Grid Connection Alternative 1 due to increased land disturbance.	Required excavations for 16km of underground cabling could have a greater potential risk relating to major accidents and natural disasters for Proposed Grid Connection Alternative 2 due to increased land disturbance.	Required excavations for 19km of underground cabling could have a greater potential risk relating to major accidents and natural disasters for Proposed Grid Connection Alternative 3 due to increased land disturbance.	Required excavations for 16km of underground cabling could have a greater potential risk relating to major accidents and natural disasters for Proposed Grid Connection Alternative 4 due to increased land disturbance.	As detailed in Chapter 17 the risk of a major accident and/or disaster during the construction of the Proposed Project is considered 'low'. The highest risk scenarios to the Proposed Project (i.e., contamination, fire/explosion, and aviation) are considered to be unlikely to occur at any phase of the Proposed Project. A detailed risk assessment on potential risks relating to major accidents and natural disasters is provided in Section 17.4 of Chapter 17of this EIAR.

3.2.5.4.3 *Proposed Substation Alternatives*

The location of the Proposed Onsite Substation and Proposed Offsite Substation were reviewed after identifying the most appropriate Proposed Grid Connection underground electrical cabling route. The following sections outline the methodology in relation to the siting of the Proposed Onsite Substation and Proposed Offsite Substation.

Proposed Onsite Substation

The Proposed Onsite Substation comprises 1 no. 220kV Gas-Insulated Substation (GIS) building, 1 no. 110kV GIS building, one control building, a 36m telecommunications tower, and the electrical components necessary to consolidate the electrical energy generated by each Proposed Turbine and export that electricity from the Proposed Wind Farm to the national grid.

Site Selection

Following determination of the Proposed Grid Connection underground electrical cabling route (see Section 3.2.5.4.1 and Section 3.2.5.4.2 above), potential locations for the Proposed Onsite Substation were considered within the Proposed Wind Farm site, having regard to the need to minimise the length of underground cabling required to connect to the Proposed Offsite Substation and, in turn, to the national grid via the existing Maynooth-Dunstown 220kV OHL.

Of the locations considered, the eastern portion of the Proposed Wind Farm site, i.e., Lodge Bog, was identified as the most suitable location for the Proposed Onsite Substation.

Constraints

The final siting of the Proposed Onsite Substation infrastructure within Lodge Bog was determined through the application of known environmental constraints, informed by detailed ecological, ornithological, and landscape and visual surveys, together with the Proposed Grid Connection underground electrical cabling route feasibility assessment described above. The principal constraints and design considerations were as follows.

Breeding curlew was recorded on the boundary of Lodge Bog and Killina Bog. In line with best-practice guidance, an 800m buffer was applied between all Proposed Project, including the Proposed Onsite Substation infrastructure, and this breeding habitat to avoid disturbance.

PCAS works within Lodge Bog were substantially advanced at the time of siting and have since been completed; on this basis, Lodge Bog had already been excluded from consideration for Proposed Turbine infrastructure, which requires a larger operational footprint. The fixed, defined footprint of the Proposed Onsite Substation and its associated infrastructure was, by contrast, capable of being accommodated within Lodge Bog without infringing on the now completed enhanced peatland rehabilitation works, with appropriate spacing from these works confirmed through detailed design.

The Proposed Onsite Substation was designed in accordance with EirGrid specifications. Given the constrained nature of the site, conventional visual screening measures – such as planting or berm – were not feasible, as these would compromise the completed PCAS interventions in the surrounding peatland. Landscape and visual mitigation were therefore focused on the cladding and colour treatment of the Proposed Onsite Substation buildings, comprising a graduated palette of horizontal bands, with darker, muted earth tones at the base transitioning to lighter tones above, finished in non-reflective, matte materials to reduce glare. This treatment, which is subject to agreement and approval by EirGrid, Kildare County Council, and the relevant TSO/TAO, is intended to break up the perceived massing of the buildings and assimilate them with the flat, open character of the receiving peatland landscape.

The selected location for the Proposed Onsite Substation minimises effects on ornithology and peatland conservation interests while remaining consistent with the technical requirements of the Proposed Grid Connection.

While the operational lifespan of the Proposed Wind Farm is expected to be 35 years (following which the Proposed Turbines may be repowered or decommissioned), the Proposed Onsite Substation, Proposed Offsite Substation, the Proposed Grid Connection and all the associated transmission infrastructure i.e. underground cables, overhead line cabling, steel masts, etc will form part of the national grid infrastructure and will operate in perpetuity as part of Transmission System and TAO assets and will remain in-situ. The assets transferred to the TAO will not form part of the decommissioning works.

Proposed Offsite Substation

The Proposed Offsite Substation comprises 1 no. 220kV GIS building, a 36m telecom tower, 2 no. steel masts, and 2 no. new gantry structures and all ancillary apparatus.

Site Selection

Following determination of the Proposed Grid Connection underground electrical cabling route (see Sections 3.2.5.4.1 and 3.2.5.4.2 above), the search area for the Proposed Offsite Substation was constrained to the area south of Prosperous, Co. Kildare, in order to ensure appropriate access could be achieved to connect the Proposed Offsite Substation to the existing Maynooth-Dunstown 220kV OHL via approximately 0.12km of loop in OHL, thereby minimising the length of new overhead line required.

Within this constrained search area, indicative areas for the Proposed Offsite Substation were reviewed as part of Proposed Grid Connection underground electrical cable route feasibility, having regard to landscape and visual sensitivity, proximity to residential receptors, and review of all potential environmental constraints. Of the locations considered, the agricultural land located off the L6002, south of Prosperous, Co. Kildare, was identified as the most suitable location for the Proposed Offsite Substation and was progressed for detailed assessment.

Constraints

The siting of the Proposed Offsite Substation was informed by detailed landscape and visual surveys, together with the Proposed Grid Connection underground electrical cabling route feasibility assessment described above.

The Proposed Offsite Substation is sited within agricultural fields currently in use as grazing pasture. This is considered to be a working agricultural landscape that has been extensively modified through agricultural activity, is not subject to any landscape designation, and is not considered to be of particular scenic or aesthetic value. A small number of residential properties are located to the east of the L6002 local road; all are set back from the L6002. The lands to the north, west, and south of the Proposed Offsite Substation comprise uninhabited, undulating agricultural fields enclosed by mature boundary vegetation, which assists in containing views of the proposed infrastructure.

On this basis, it was determined that the location of the Proposed Offsite Substation, in the agricultural fields east of the L6002 and south of Prosperous, Co. Kildare, would achieve appropriate separation distances from sensitive receptors while remaining suitably positioned to connect the Proposed Project to the national grid.

While the operational lifespan of the Proposed Wind Farm is expected to be 35 years (following which the Proposed Turbines may be repowered or decommissioned), the Proposed Onsite Substation, Proposed Offsite Substation and the Proposed Grid Connection and all the associated transmission infrastructure i.e. underground cables, overhead line cabling, steel masts, etc will form part of the

national grid infrastructure and operate in perpetuity as part of Transmission System and TAO assets and will remain in-situ. The assets transferred to the TAO will not form part of the decommissioning works.

3.2.5.5 Alternative Enhancement Areas

Similar to the Proposed Wind Farm layout, the Proposed Enhancement Areas were subject to an iterative design process. As outlined in Chapter 6: Biodiversity and Chapter 7: Ornithology of the EIAR, several sensitive habitats as well as floral and faunal species were recorded during surveys of the Project Site and its wider surroundings. Without mitigation, there is the potential to significantly impact these species and habitats if the Proposed Project is built. Consequently, a comprehensive biodiversity management plan (BMP) is presented as Appendix 6-5, outlining measures of mitigating against/and offsetting identified significant effects on these sensitive receptors.

The enhancement areas were refined through three iterative main design phases, consideration was given to species and habitats of relevance to the Project Site. Specific consideration was given to Key Ecological Receptors (KERs) (as identified in Section 6.3.5 of Chapter 6), Key Ornithological Receptors (KORs) (as identified in Section 7.4.2 of Chapter 7), and any potential for significant negative environmental effects resulting from the Proposed Project. Cumulative effects on species of ornithological value were also a key consideration in the design and assessment of the Proposed Project, with findings from the biodiversity assessment (see Chapter 6: Biodiversity) and the ornithological assessment (see Chapter 7: Ornithology) being incorporated into the BMP. The final enhancement areas have been refined following feedback from the project team and scoping/consultation with the National Parks and Wildlife Service (NPWS), Butterfly Conservation Ireland (BCI), and Inland Fisheries Ireland (IFI). Plate 3-13 to Plate 3-15 below gives an indication of how the design of the Proposed Enhancement Areas evolved throughout the design process

Proposed Enhancement Areas Iteration No. 1

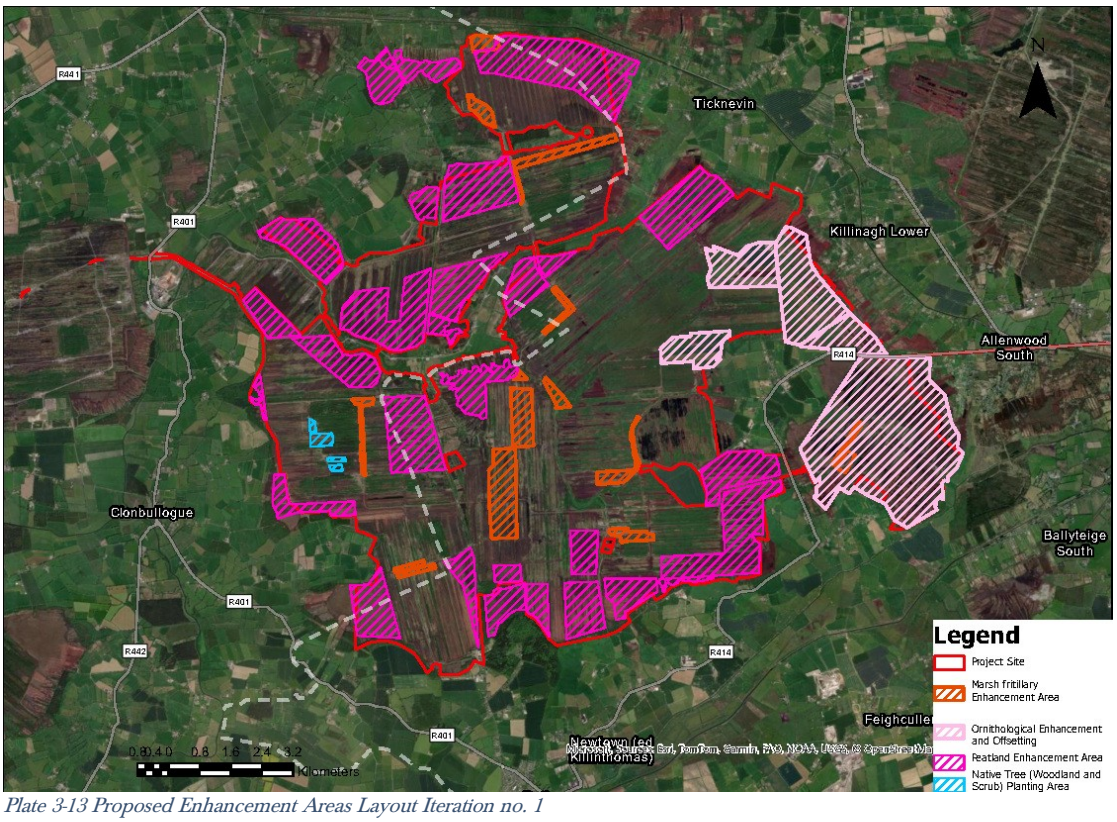


Plate 3-13 Proposed Enhancement Areas Layout Iteration no. 1

Desk-based studies identified that many habitats within the Project Site have potential for inclusion in the BMP for the Proposed Project. The first iteration of Proposed Enhancement Areas (shown in Plate 3-13 above) established large habitat blocks as provisional enhancement areas, which were subsequently refined through field-based surveys and specialist input. Plate 3-13 presents the initial provisional areas within which potential habitat enhancement opportunities were identified and assessed. The primary objective of these areas was to improve existing habitat conditions within and around the proposed infrastructure of the Proposed Project, as well as create and enhance suitable habitat for species of high ornithological and ecological value outside suitable setback distances from the proposed infrastructure and other existing or proposed wind energy in the wider area.

Proposed Enhancement Areas Iteration No.2

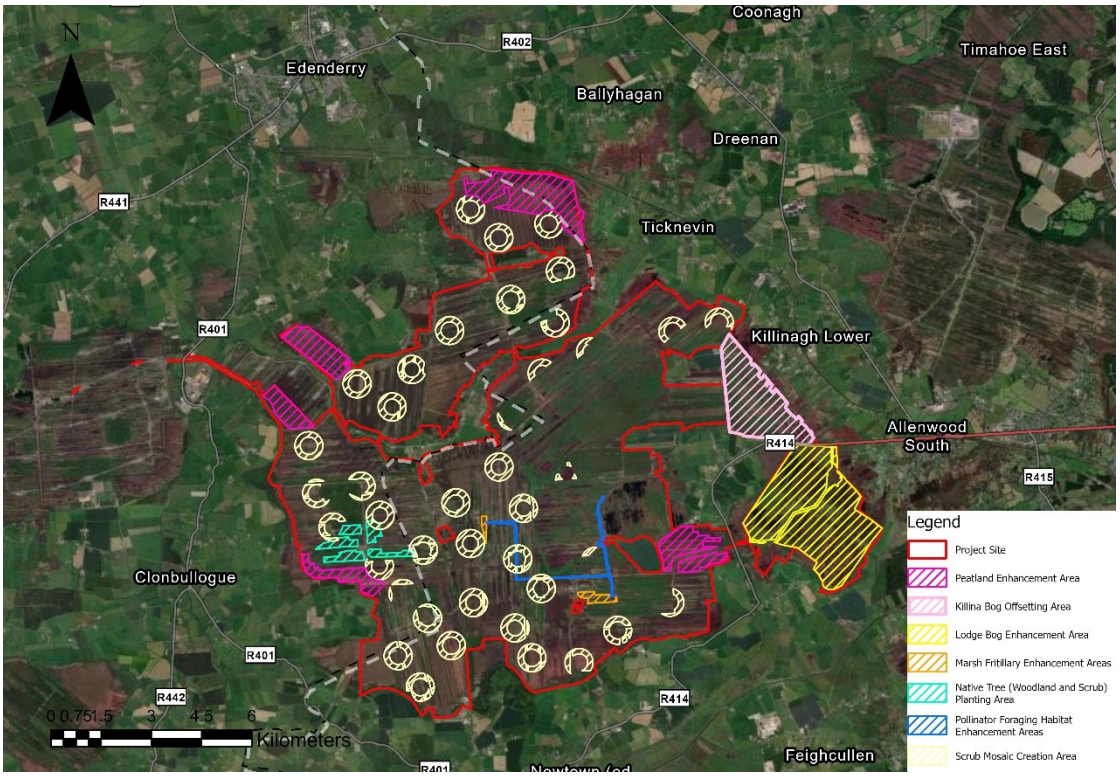


Plate 3-14 Proposed Enhancement Areas Iteration No. 2

Iteration 2 is where the large provisional enhancement areas became carefully considered, site specific detailed enhancement areas. Following comprehensive field surveys and scoping/consultation with key stakeholders (NPWS. IFI, and BCI), a revised layout was developed. Key refinements to Proposed Enhancement Areas Iteration no. 2 included the following;

Scrub Mosaic Creation Area

- Introduction of scrub planting around Proposed Turbines to discourage golden plover use in proximity to turbines
- Identification of alternative enhancement locations to offset loss of suitable golden plover habitat in the proposed scrub planting areas.

Peatland Enhancement Area

- Refinement of enhancement areas based on confirmed suitable habitat and existing drain networks

Marsh Fritillary Enhancement Area

- Exclusion of areas to better align with the other enhancement proposals i.e., avoiding areas containing Marsh Fritillary (*Euphydryas aurinia*) larval habitat.

Killina Bog Offsetting Area

- Refined to avoid areas of existing high-quality habitat within Killina Bog

Native Tree (Woodland and Scrub) Planting Area

- Several new blocks identified that are suitable for native tree (woodland and scrub) planting based on site surveys.

Pollinator Foraging Enhancement Area

- Areas of linear habitat creation and enhancement to improve pollinator foraging habitat enhancement areas across the Project Site (recommendation from BCI).

Lodge Bog Enhancement Area

- Area refined to align with PCAS objectives relevant to recently completed works in Lodge Bog.

Refinements were also made so that the Proposed Enhancement Areas didn't conflict with each other. For example, that scrub mosaic creation area was designed to avoid areas where larval webs for marsh fritillary were identified.

Proposed Enhancement Areas Iteration No. 3

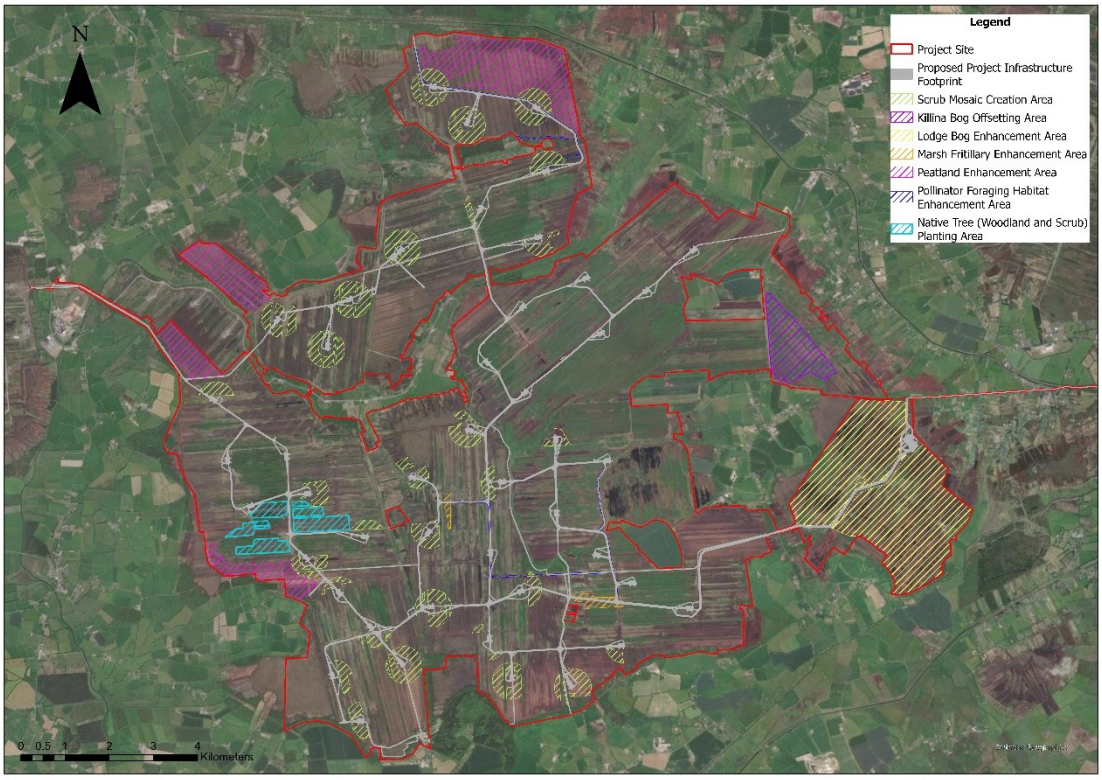


Plate 3-15 Proposed Enhancement Site - Final Layout

The final iteration of the Proposed Enhancement Areas shown in Plate 3-15 outlines' refinements within the Proposed Enhancement Areas following extensive environmental and ecological assessment, including hydrological connectivity and geotechnical peat stability assessments. The final iteration looked to rename the designated areas to more appropriately identify the measures contained and refine areas based on suitable habitat (e.g., removal of areas already identified during surveys as scrub habitat and to avoid areas of raised bog (protected habitat), and to align the Proposed Enhancement Areas with other elements of the Proposed Project. i.e., road access, peat and spoil areas).

The BMP included in Appendix 6-5 details all Proposed Enhancement Areas; the key measures outlined within the BMP include:

- **Native Tree (Woodland and Scrub) Planting Area:** Establishment of native woodland habitat in suitable locations
- **Peatland Enhancement Area**: Active restoration of degraded peatland
- **Scrub Mosaic Creation Area**: Management of habitat to reduce collision and displacement risk for relevant KORs including scrub mosaic planting and associated management of the same.
- **Killina Bog Offsetting Area**: Creation or enhancement of alternative habitat to offset losses to suitable golden plover and breeding wader habitat in close proximity to Proposed Turbines
- **Marsh Fritillary Enhancement Area**: Protection and enhancement of habitats including larval host plants such as devils' bit scabious and associated habitat
- **Lodge Bog Enhancement Area**: Site-specific enhancements for Lodge Bog (Scrub removal and management, permanent waterbodies for whooper swan, golden plover, breeding lapwing, and breeding wader areas, as well as permanent reedbeds for Hen Harrier)
- **Pollinator Foraging Habitat Enhancement Area**: Creation and enhancement of linear habitats to support pollinator populations
- **Best Practice Measures**: biodiversity enhancement measures for pollinators (including bees), falcon, bats, pine marten, and red squirrel and measures outlined to protect flora and fauna during amenity activities are outlined in Section 4.8 of Appendix 6-5. These measures are not required to mitigate or offset identified significant effects.

The BMP has been constraints and facilitators led. For example, creation of peatland habitat will only be developed in areas which have a suitable factor of safety value and negligible risk rating based on existing ground conditions within the geotechnical and peat stability risk assessment included as Appendix 8-1 of the EIAR. Full details on BMP measures are included in Appendix 6-5.

3.2.5.6 Alternative Mast Locations

3.2.5.6.1 *Alternative Met Mast Locations*

The initial design included for one proposed anemometry mast located in the middle of the Project Site, at a height of 40m. As detailed design progressed, alongside review of requirements by EirGrid, clause WFPS1 – Wind Farm Power Station Grid Code Provisions, under WFPS1.7 Signals, Communications & Control, stating that '*The meteorological data signals shall be provided by a dedicated Meteorological Mast located at the Wind Farm Power Station site or, where possible and preferable to do so, data from a means of the same or better accuracy. For or Wind Farm Power Stations where the WTG are widely dispersed over a large geographical area and rather different weather patterns are expected for different sections of the Wind Farm Power Station, the meteorological data shall be provided from a number of individual Meteorological Masts.*'[11] It was therefore determined that 2 no. masts, 40m in height, would be required to ensure alignment with EirGrid design requirements.

[11] https://cruie-live-96ca64acab2247eca8a850a7e54b-5b34f62.divio-media.com/documents/cer04136-1.pdf

The 2 no. met masts are located in proximity to Proposed Turbine T15 and Proposed Turbine T40 of the Proposed Wind Farm. A free-standing mast (e.g., no guy wires) design was chosen as it will have a reduced collision risk potential on ornithological receptors.

3.2.5.6.2 *Alternative Relay Mast Locations*

During detailed telecommunication scoping in July 2020 and March 2025, it was identified that there are 3 no. Virgin Media links traversing the Project Site, which would interact with the Proposed Turbine locations. Ai Bridges was commissioned to carry out a detailed telecommunications impact assessment (Appendix 15-7). A relay mast was proposed to mitigate for the impacts caused by the Proposed Turbines on Virgin Media radio links.

The siting of the proposed relay mast was restricted by topography, the turbine density of the Proposed Wind Farm, and the existing turbines at Cushaling Wind Farm. Therefore, the most appropriate location of the relay mast was identified by Ai Bridge to align with all relevant constraints.

The 1 no. relay mast is located in proximity to Proposed Turbine T23 of the Proposed Wind Farm.

3.2.5.7 Alternative Design of Ancillary Structures

The supporting temporary infrastructure required for the Proposed Project include temporary construction compounds and temporary security cabins.

3.2.5.7.1 *Construction Compounds*

The construction compounds will be used for the storage of all construction materials, plant and turbine components. The construction compounds are interspersed at 10 no. separate locations throughout the Project Site and are accessed via the internal site roads that will be constructed. The use of multiple temporary construction compounds was deemed preferable to the alternative of a single large compound in the centre of the Project Site for a number of reasons. Principally, it will facilitate more efficient construction practices and will result in shorter distances for traffic movements within the Project Site during construction. As a result, vehicle emissions and the potential for dust arisings will be reduced by making use of 10 no. construction compounds rather than 1 no. larger construction compound.

3.2.6 Alternative Turbine Delivery/Haul Routes and Access Options

This section discusses the options considered for construction haul routes and turbine component delivery to the Proposed Wind Farm, the options considered for the construction phase site entrances and the options considered for the operational phase for maintenance and amenity use.

In order to inform the construction haul routes and turbine delivery for the Proposed Project, and ultimately determine optimum site entrance locations, a detailed traffic and transport feasibility assessment was undertaken. The purpose of this assessment was to carry out a preliminary capacity assessment for all construction haul routes considered to inform design, construction phase delivery strategy and the construction program. This assessment was undertaken by Alan Lipscombe of Alan Lipscombe Traffic and Transport Consultants Ltd with detailed inputs from the BnM following their experience on the recent construction phase of Derrinlough Wind Farm in Co. Offaly.

The Preliminary Capacity Assessment for Delivery Routes is detailed in Chapter 15 and is summarised below under each relative section.

3.2.6.1 Alternative Construction/Operational Entrance Options

The Project Site is currently served by a number of existing tracks and access roads due to its previous use as a commercially harvested bog. As part of the Proposed Project, it is proposed to upgrade 4 no. of existing entrances and facilitate 8 no. new site entrances. These site entrances will be used throughout the construction, operation, and decommissioning phases of the Proposed Project to enable delivery of materials and turbine components (construction phase), amenity access and maintenance/monitoring (operational phase), and removal of Proposed Project infrastructure (decommissioning phase). Please see Plate 3-16 below for the location context of all Project Site entrances.

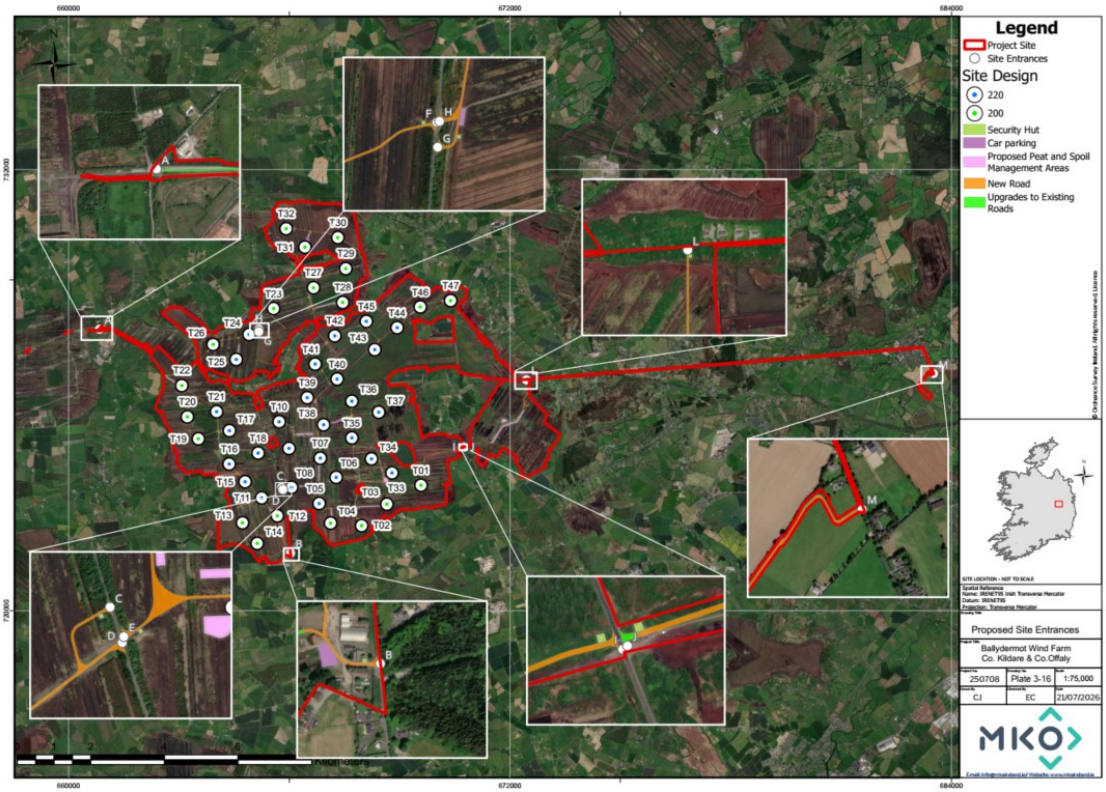


Plate 3-16 Proposed Site Entrances

Due to the nature of the Proposed Project, all proposed works will be local to the Project Site and as such, the construction phase will utilise 10 of the proposed 12 no. site entrance locations for construction material delivery. Of the 10 no. construction site entrance locations, 4 no. are existing site entrances that will be upgraded, and 8 no. are proposed new entrances. Turbine delivery will utilise 5 no. entrances – delivery of turbine components to the Project Site is outlined in Section 3.2.6.3 below. An existing agricultural site entrance off the L6002 local road network will also be upgraded to facilitate construction phase access to the Proposed Offsite Substation and associated OHL connection into the existing Maynooth-Dunstown 220kV OHL.

At initial design stage, 14 no. site entrances were considered for use during the construction phase and operational phase to facilitate amenity and/or maintenance and monitoring activity.

Following the outcome of the Preliminary Capacity Assessment for Delivery Routes the proposed site entrance at the Edenderry Power Limited off the R401 and the former Lullymore factory off the R403/L50252 was not progressed for assessment due to the entrance's not having the required visibility to facilitate the safe egress of construction traffic in and out of the site onto the R401. The use of all remaining 12 no. proposed site entrance for the purposes of construction was determined to not be

suitable due to required visibility splays and the impact on the local road network, therefore, only 10 no. entrances were progressed for use during the construction phase. During the operational phase, it was identified that further clarity on accessibility of the operational site entrances would be required.

The operational phase will utilise 10 no. site entrance locations to facilitate maintenance and monitoring activity and amenity access. Of the 10 no. site entrances to be used for the operational phase, all entrances will be used for maintenance and monitoring activity, with 3 no. entrances (Site Entrance 2B, Site Entrance 4G, and Site Entrance 5I) also being available for amenity access. Site Entrance 3C and Site Entrance 4H will not be used during the operational phase.

Additionally, the traffic assessment has deemed only Site Entrance 1A (please see Table 4-7 in Chapter 4) as suitable for the purposes of abnormal load delivery; Site Entrance 3C, Site Entrance 3E, Site Entrance 4F and Site Entrance 4H will facilitate the transport of turbine components throughout the Proposed Wind Farm via the internal access road network. Abnormal load delivery vehicles will utilise the existing construction access off the R401 regional national road which will be widened to facilitate abnormal load delivery (please see Figure 4-44 in Chapter 4 for details).

As outlined in Section 4.5.3 of Chapter 4, the procedures for transporting abnormal size loads on the country's roads are well established and it is proposed that deliveries of turbine components to the Proposed Wind Farm may be made in convoys of three to four vehicles at a time, and at night when roads are quietest. All abnormal load delivery will enter the Proposed Wind Farm via Site Entrance 1A and will utilise the internal road network, as well as Site Entrance 3C, Site Entrance 3E, Site Entrance 4F and Site Entrance 4H to transport turbine components throughout the Proposed Wind Farm. The above referenced site entrances represent crossroad junctions; it was determined that due to the nature of turbine delivery it would be appropriate to utilise the crossroads along the L1001 and L3001 local roads due to the delivery of abnormal loads being made at night when the roads are quietest. The crossroad junctions at these entrances will be used exclusively for abnormal load delivery; to safeguard against any adverse impacts on road users, no construction materials will be moved through Site Entrance 3D or Site Entrance 4G.

Please refer to Section 4.5.1, Table 4-7 in Chapter 4: Description of the Proposed Project for further information on site entrances.

3.2.6.2 Alternative Construction Haul Routes

In order to facilitate the construction of the Proposed Project, all crushed stone, hardcore materials and ready-mix concrete that will be required during the construction phase will be sourced from local, appropriately authorised quarries. There are no borrow pits proposed as part of the Proposed Project. As identified in Section 3.2.5.1 above, BnM have extensive experience in the design and construction of wind farms and have utilised their ongoing experience on the recent construction of Derrinlough Wind Farm in Co. Offaly to inform the construction materials volume requirements for the Proposed Project.

Once the construction site entrances were identified, proposed construction haul route options were identified with each route corresponding to the most appropriate site entrance for the construction phase of the Proposed Project; please refer to Section 3.2.6.1.1 above for further information on site entrances.

The preliminary routes were identified as existing travel routes, following national, regional and local roads, from existing local appropriately authorised quarries.

The Preliminary Capacity Assessment for Delivery Routes assessed the construction material haul routes, Proposed Grid Connection underground cabling diversion routes, and the turbine delivery route.

Please see Section 15.1.12.2 for further detail on the Proposed Grid Connection diversion routes. Please see Section 3.2.6.3 below for further detail on the Proposed Turbine Delivery Route.

The Preliminary Capacity Assessment for Delivery Routes utilised a 2025 base year for assessment of daily traffic flows. Traffic flows were obtained from automatic traffic counts and classified turning counts undertaken at 32 no. locations on the Proposed Construction Haul Routes and Proposed Turbine Delivery Route. These flows were then factored into a potential construction year of 2030 using TII growth factors, noting that there are different 2025 to 2030 factors for County Offaly (1.060) and for County Kildare (1.088), with the latter higher growth factor adopted for the assessment. The preliminary estimate of daily construction traffic volumes was based on an assumed volume of imported stone, and associated traffic movements based on a heavy goods vehicle (HGV) having a carrying capacity of 20 tonnes.

The Preliminary Capacity Assessment for Delivery Routes utilised 4 no. scenarios to determine the suitability of the Proposed Construction Haul Routes and Proposed Turbine Delivery Route, these scenarios include for variance in total stone requirements and in construction phase duration. These scenarios were assessed by Alan Lipscombe Traffic and Transport Consultants Ltd and were utilised to inform the most appropriate construction material haul routes to progress for assessment in the EIAR.

The scenarios tested included the following parameters:

- Scenario 1 – 700,000m^3 of material over 24 months (approximately 170 loads per day).
- Scenario 2 – 1,108,828m^3 of material over 24 months (approximately 261 loads per day).
- Scenario 3 – 1,108,828m^3 of material over 30 months (approximately 209 loads per day).
- Scenario 4 – 1,108,828m^3 of material over 36 months (approximately 176 loads per day).

Scenario 1 was not progressed for assessment due to the estimated stone volume no longer being considered for the Project Site.

Scenario 2 has the shortest construction duration (i.e., 24 months) and therefore the highest concentration of transport loads on the road network (i.e., 261 loads/day). The longer construction periods assessed in Scenario 3 and Scenario 4 would by nature reduce the impact on the public road network, however under a theoretical precautionary assessment approach. Detailed assessment and modelling was ran on all scenarios; following the completion of this assessment Scenario 2 was deemed the most appropriate assessment scenario and appropriate routes were identified from local authorised quarries.

The Proposed Construction Haul Routes have been considered throughout the EIAR and were informed by meetings with the roads/traffic departments of both Kildare and Offaly County Councils.

The routes were further refined via detailed assessments from the project team relating to link capacity, dust emissions, and effects on residential amenity.

Initially, 10 no. quarries were reviewed for use during the construction phased of the Proposed Project. Please see Plate 3-17 below.

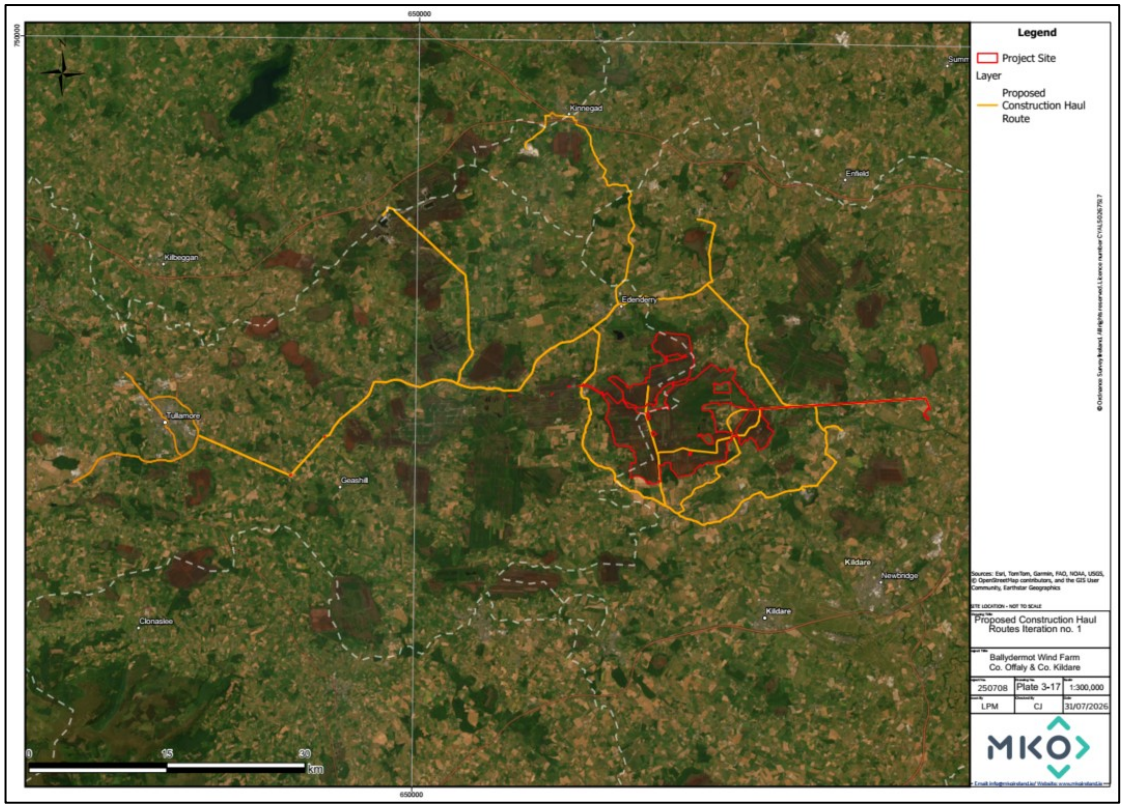


Plate 3-17 Proposed Construction Haul Routes Iteration no. 1

After link capacity assessments were completed, it was determined that the roads serving Breedon Cement, Kinnegad, Co. Westmeath (i.e., the R148) did not have sufficient link capacity for use during the construction phase of the Proposed Project. Therefore, this route was removed from assessment.

The Proposed Construction Haul Routes were further refined with the below following detailed assessment by the project team:

- Route from Roadstone Concrete, Tullamore, Co. Offaly was redirected from traversing through Tullamore Town to the N52 national road via the R443 regional road to avoid associated traffic and air quality effects on sensitive receptors within Tullamore Town.
- Removal of route traversing the R414 to the southeast/east of the Proposed Wind Farm, route will now utilise internal access roads to avoid associated traffic and air quality effects on sensitive receptors along the R414 regional road.

Please see the final Proposed Construction Haul Routes in Plate 3-18 below. Refer to Section 15.1.6 of Chapter 4 and Section 4.5.2.1 of Chapter 4 for further details on the Proposed Construction Haul Routes.

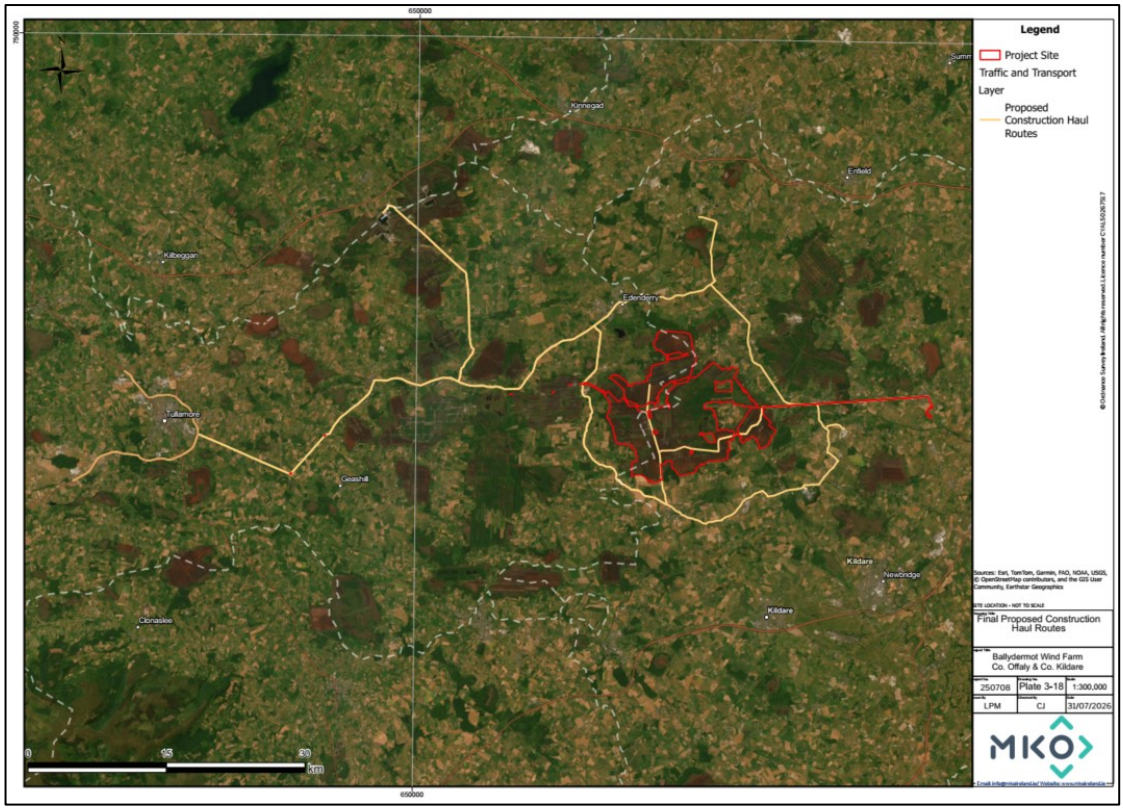


Plate 3-18 Final Proposed Construction Haul Routes

For the purposes of assessment within the EIAR, 9 no. existing, authorised quarries, located within 20km of the Project Site have been selected and are shown in Figure 4-53 of Chapter 4.

3.2.6.3 Alternative Turbine Component Delivery Routes

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

3.2.6.3.1 *Alternative Ports of Entry*

The alternatives considered for the port of entry of wind turbines into Ireland for the Proposed Project include the Port of Galway, Shannon Foynes Port, the Port of Waterford, and Dublin Port. Shannon Foynes Port is the principal deepwater facility on the Shannon Estuary and caters for dry bulk, break bulk, liquid and project cargoes. Port of Galway and Dublin Ports also offers a roll-on/roll-off procedure to facilitate import of wind turbines. The Port of Waterford offers Lift-On/Lift-Off, Bulk Handling, Project Pilotage, Towage & Tugs, Rail Transport, Cruise, Storage and Rental services. All four ports, and indeed others in the state, offer potential for the importing of turbine components.

Prior to the commencement of turbine component delivery, the final port of entry will be confirmed following a detailed review of Irish ports and their capacity to facilitate the transport of the Proposed Project's turbine components via the national motorway network. The final selection will be driven by commercial, availability and scheduling considerations. There are clear access routes for all four ports utilising the motorway network to the proposed haul route to the site. For the purpose of this EIAR, the primary port of entry assessed is the Port of Galway.

3.2.6.3.2 Alternative Turbine Delivery Routes

For turbine transport, cognisance was taken of the haul routes used for other wind farm developments in the Midlands in addition to the general preference to primarily use National and Regional roads where possible with minimal requirements for junction accommodation works. This approach was deemed preferable to using local roads to minimise significant upgrade works to local roads and associated environmental effects.

The assessment of the most suitable delivery routes was conducted in parallel with the assessment of potential site entrances as outlined above. For the delivery of turbine components to the Project Site, the Port of Galway was identified as the most appropriate route for assessment. Galway Port is regularly used for the delivery of wind turbine components, and the transport of abnormal loads from the port to the national motorway network is well established. A detailed swept path analysis has confirmed that the Proposed Turbine Delivery Route from the M6 motorway can accommodate the Proposed Turbine components without the need for substantive accommodation works.

After site visits were completed and detailed site investigative works were done, it was determined that the identified route from the Port of Galway for the purposes of turbine component delivery was appropriate and therefore no alternatives were considered. The utilisation of the identified route from the M6 to the Proposed Wind Farm was identified as the preferred option for abnormal load delivery given the limited road upgrade work required and its proven suitability for the transport of turbine components for the Cloncreen Wind Farm, which is located directly to the west of the Proposed Wind Farm. It is proposed the Proposed Turbine Delivery Route goes through Cloncreen Wind Farm to reach the Proposed Site.

Further, the transport analysis (as presented in Chapter 15 of this EIAR), shows that localised accommodation works will be required to accommodate delivery of the Proposed Turbines and these works are assessed in the EIAR. The turbine transport route will utilise the national and primary roads available to ensure the road network holds the capacity to manage large loads.

Please see Plate 3-19 below which shows the turbine delivery route from the M6.

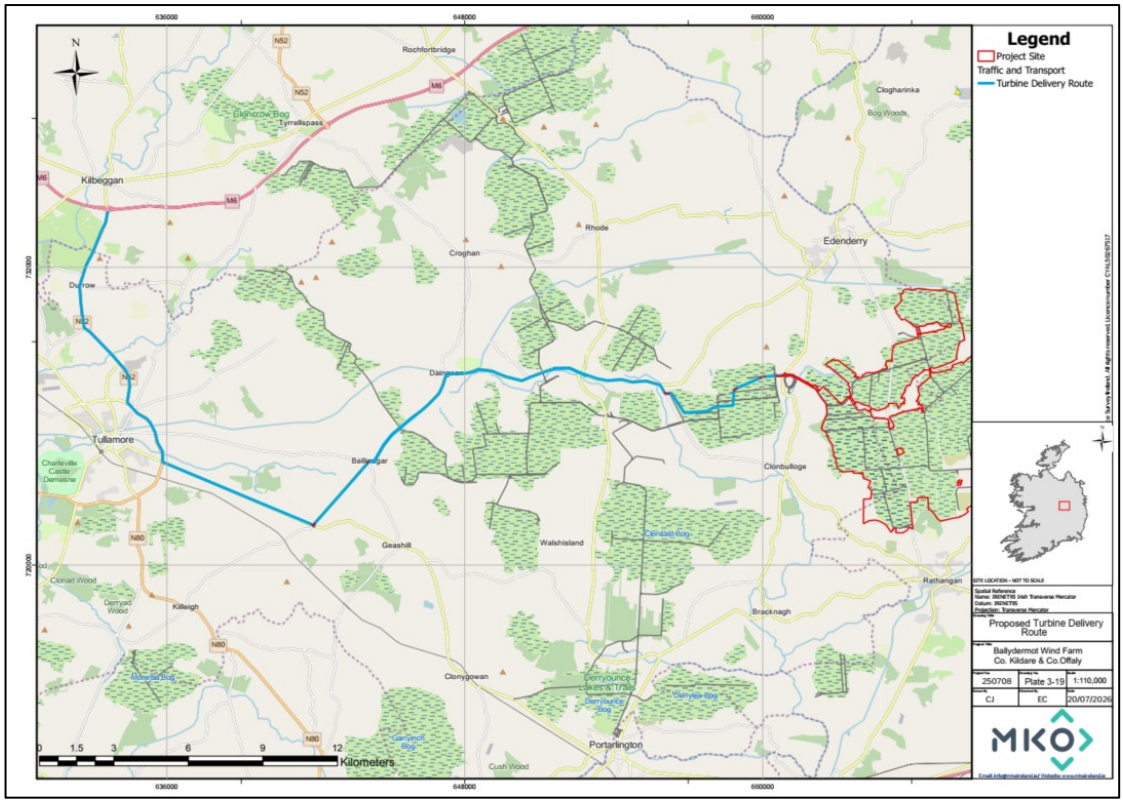


Plate 3-19 Proposed Turbine Blade Transport Route from the Exit off the Motorway

3.2.7 Alternative Mitigation Measures

Mitigation by avoidance has been a key aspect of the Proposed Project's evolution through the site selection and design process. Avoidance of the most ecologically and environmentally sensitive areas of the Project Site limits the potential for environmental effects. The Proposed Project layout aims to avoid any environmentally sensitive areas. Where loss of habitat occurs in the Site, dedicated enhancement and mitigation have been proposed, the design of which has been refined through the constraints -led iterative design process. Any clear-felled forestry permanently felled within the footprint of the Proposed Wind Farm infrastructure will be subject to a Limited Felling Licence (LFL) application to the Forest Service in accordance with the Forestry Act 2014 and the Forestry Regulations 2017 (SI 191/2017) and as per the Forest Service's policy on granting felling licenses for wind farm developments. The specific lands on which any such replacement afforestation would occur have not been identified at this stage. On a precautionary basis, the Applicant commits that, where replacement afforestation is required, the replacement afforestation lands will be located at least 10km from the Proposed Wind Farm and will not be located where there is a hydrological pathway through which the afforestation works could give rise to cumulative effects with the Proposed Project. The alternative to this approach is to encroach on the environmentally sensitive areas of the Project 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 identified impacts; the Proposed Project has also avoided, insofar as possible, any potential pathways between the Project Site and identified environmental receptors. Detailed mitigation measures set up in the EIAR will reduce any identified impacts where the potential pathway to environmental receptors cannot be fully avoided. The alternative would be to either omit these measures or propose measures which are not best practice and effective and neither of these options would be sustainable.